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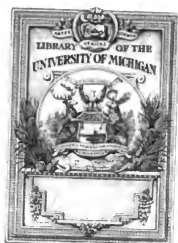






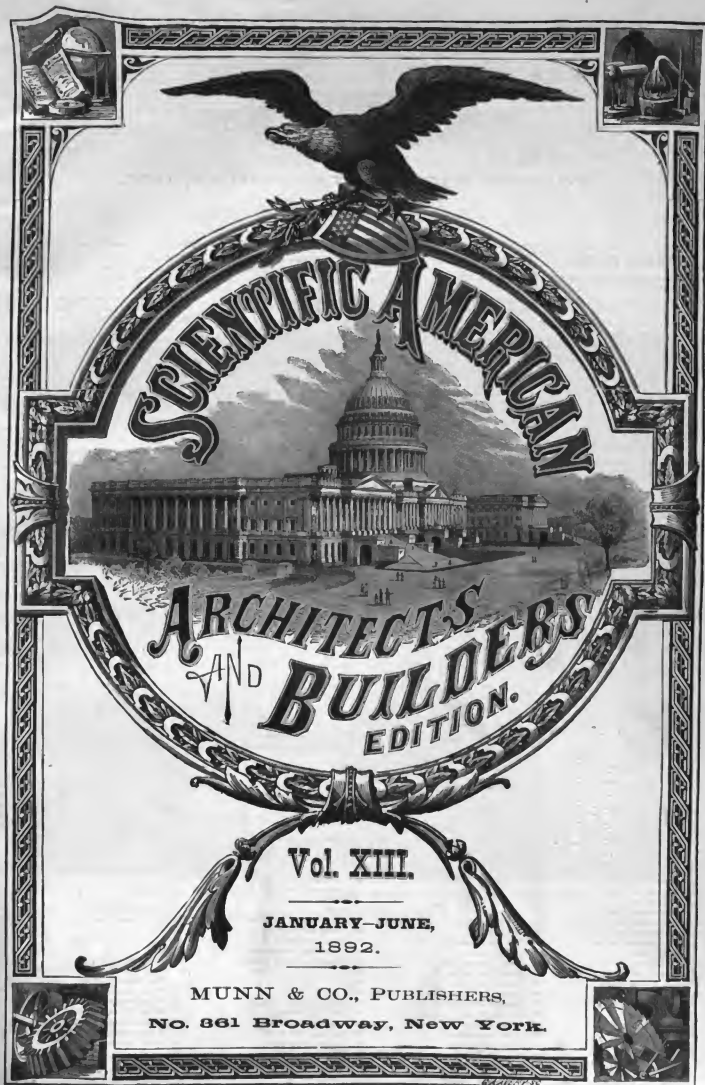
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SCIENTIFIC AMERICAN



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AND  
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Vol. XIII.

JANUARY-JUNE,  
1892.

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# VOLUME XIII.-JANUARY-JUNE, 1892.

Articles Marked \* are illustrated.

## COLORED PLATES.

- I. Residence at Black Rock, Conn. II.
- A colonial house. January.
- III. Cottage in Maine. IV. Cottage at Short Hills, N. J. February.
- V. Cottage at Seaside Park. VI. Cottage for \$1,500. March.
- VII. Cottage at New Rochelle. VIII.
- Residence at Bensonhurst. April.
- IX. Residence at Bridgeport, Conn. X.
- Cottage near Portland, Me. May.
- XI. Cottage at Bensonhurst, Long Island. XII. Residence at Plainfield, N. J. June.

## MISCELLANY.

Figures preceded by a (P) refer to illustrated articles.

### A

- Acoustics..... 42
- Architect, home of..... 29
- Architects, compensation of..... 77
- Architecture and poetry..... 18
- Art, utility and..... 31
- Asphalt streets..... 25
- Auditorium, keynote of..... 71

### B

- Band, scroll and reed..... 116
- Bath tub, combination..... 82
- Baths of Diocletian..... 48
- Bedroom furnishing..... 77
- Hrd tracks in stone..... 8
- Brick, white stain on..... 70
- Bricks, resistance of..... 98

### C

- Cabinet shop machine..... 47
- Castings, zinc, reporation..... 8
- Celling board, Sackett's..... 28
- Ceilings, low..... 46
- Chair, metal..... 64
- Chairs, types of..... 68
- Chapel, cemetery..... 61
- Chimney piece..... 43
- Chimneys, taper of..... 43
- Church, a \$2,600..... 75
- Church, Gardiner, Me..... 75
- Church and parsonage..... 61
- Church spire..... 30
- Church, St. Andrew's, New York..... 71
- Church, Upper Montclair..... 70, 81
- Cistern, rain water..... 78
- City Hall, Philadelphia..... 98
- Climber, stair, electric..... 92
- Constructions, American..... 77
- Cottage for \$1,500..... 24
- Cottage at Asbury Park, N. J..... 84
- Cottage at Asbury Park..... 81
- Cottage, Beaconhurst..... 90
- Cottage at Diamond Island..... 66
- Cottage, English..... 49
- Cottage in Maine..... 19
- Cottage on Maine coast..... 90
- Cottage of moderate cost..... 98
- Cottage, mountain..... 72
- Cottage at New Rochelle..... 50
- Cottage, one story..... 49
- Cottage near Portland, Me..... 66
- Cottage, Queen Anne..... 98
- Cottage, Richmond, Mo..... 73
- Cottage at Seaside Park..... 24
- Cottage at Short Hills, N. J..... 32
- Cotton bale tie..... 32
- Crescent Block, Bridgeport..... 80, 82, 83

Cypress, stained..... 46

### D

- Decorations, interior..... 70
- Decorations, staff..... 70
- Design, shadow in..... 63
- Diana, weather vane..... 71
- Door hanger..... 71
- Door hanger, Warner..... 71
- Doors, partition..... 68
- Drawing room, Chippendale..... 70
- Dress Institute..... 70
- Dumbwaiter, "Paragon"..... 70
- Dwelling for \$1,100..... 74
- Dwelling for \$1,900..... 74
- Dwelling at Albany..... 71
- Dwelling at Augusta, Me..... 71
- Dwelling at Belle Haven..... 71
- Dwelling at Bridgeport, Conn..... 70
- Dwelling at Bensonhurst..... 70
- Dwelling at Black Rock, Conn..... 72
- Dwelling, Bridgeport, Conn..... 72
- Dwelling at Bridgeport, Conn..... 70
- Dwelling, California..... 74
- Dwelling at Carthage, Ill..... 71
- Dwelling at Cleveland, O..... 71
- Dwelling, colonial..... 72
- Dwelling, colonial..... 72
- Dwelling at East Park, Pa..... 74
- Dwelling of moderate cost..... 90, 90
- Dwelling at Montclair..... 70
- Dwelling, Mountainside..... 71
- Dwelling near New York..... 71
- Dwelling near New York..... 71
- Dwelling at Portland, Me..... 71
- Dwelling, Rochester, N. Y..... 71
- Dwelling, suburban..... 71

### E

- Earphone..... 78
- Elevators, speed of..... 81
- Engine, gas, Charter..... 94
- Exhaust, don't turn into sewer..... 74

### F

- Fair, World's, notes on..... 13
- Fertilizer for window garden..... 16
- Floor, tile water..... 76
- Fireproofing, recipes..... 70
- Floes, to get rid of..... 63
- Floors, finish of..... 77
- Floor, hard wood..... 77
- Floor, hard wood, treatment..... 85
- Floor, tile and water..... 76
- Forests, areas of..... 39
- Foundations, curious..... 71
- Furnace, blast, plumber's..... 64
- Furnishing, simplicity in..... 30

### H

- Hall, design for..... 115
- Hall, entrance..... 70
- Hall, stair, design for..... 71
- Hanger, door..... 30
- Heater, economy..... 71
- Heater, hot water..... 77
- Heater, hot water, Bolton..... 94
- Heater, hot water, Nolan..... 98
- Hearing, hot water vs. steam..... 15
- Hinges, door..... 30
- Hinge, Stearns..... 70
- Home, an architect's..... 98
- House for \$1,100..... 74
- House for \$1,900..... 74
- House, Albany..... 71
- House at Augusta, Me..... 71
- House at Belle Haven..... 71
- House at Bensonhurst..... 70

- House at Bensonhurst..... 70
- House at Black Rock, Conn..... 72
- House, Bridgeport, Conn..... 72
- House, Bridgeport, Conn..... 72
- House at Bridgeport, Conn..... 70
- House, Bridgeport, Conn..... 70
- House, California..... 74
- House at Carthage, Ill..... 71
- House at Cleveland, O..... 71
- House, colonial..... 72
- House, colonial..... 72
- House, colonial, Portland, Me..... 74
- House at East Park, Pa..... 74
- House at East Park, Pa..... 74
- House at Montclair..... 70
- House, Mountain Side..... 71
- House near New York..... 71
- House near New York..... 71
- House at Portland, Me..... 71
- House, Rochester, N. Y..... 71
- House, suburban..... 71
- Houses, burning, buying..... 48
- Houses, frame, planning..... 22
- Houses near New York..... 90, 87

### I

- Iron rust cause of fire..... 5
- Irrigation in Nevada..... 61
- Interiors, Japanese..... 25
- Inventors, suggestion for..... 39

### L

- Lawn planting..... 25

### M

- Match Company, Diamond..... 48
- Masonry, good, secret of..... 81
- Mica, how to clean..... 81
- Mitering machine..... 78
- Moulder, standard..... 15

### N

- Newels and balusters..... 94
- Nickel, trimmings, cleaning..... 3

### O

- Old Fellows' Temple, Chicago..... 70
- Organ, design for..... 70

### P

- Paint, what is the best..... 12
- Palace of Varieties, Manchester..... 76
- Paper from corn husks..... 30
- Paper, transfer..... 74
- Parsonage and church..... 61
- Parsonage, Gardiner, Me..... 75
- Pavement, cork..... 88
- Pest..... 70
- Pipe, iron, to keep from rusting..... 74
- Planner and polisher..... 47
- Plans, ownership of..... 30
- Plastering composition..... 61
- Plumb and level, Stanley..... 42

### R

- Rail, protection against..... 48
- Redwood, durability of..... 15
- Reed and band scroll..... 70
- Resistance for \$1,100..... 74
- Resistance for \$1,900..... 74
- Resistance at Albany..... 74
- Resistance at Augusta, Me..... 71
- Resistance at Belle Haven..... 71
- Resistance at Bensonhurst..... 70

- Residence at Black Rock, Conn..... 72
- Residence, Asbury Park..... 70, 81
- Residence, Babylon, N. Y..... 84, 85
- Residence, Bridgeport, Conn..... 72
- Residence, Bridgeport, Conn..... 72
- Residence at Bridgeport, Conn..... 70
- Residence, Bridgeport, Conn..... 70
- Residence, California..... 74
- Residence at Carthage, Ill..... 71
- Residence at Cleveland, O..... 71
- Residence, colonial..... 72
- Residence at East Park, Pa..... 74
- Residence, Lodi, N. Y..... 70
- Residence at Montclair..... 70
- Residence, Mountain Side..... 71
- Residence near New York..... 71
- Residence near New York..... 71
- Residence, Plainfield, N. J..... 70
- Residence at Portland, Me..... 71
- Residence at Rochester..... 71
- Residence, suburban..... 71
- Room, Chippendale..... 70
- Must, iron, cause of fire..... 5

### S

- Sash and blind machine..... 84
- Schoolhouse, Upper Montclair..... 80, 80
- Screens, moderate price..... 77
- Screens, ventilating duct..... 65
- Senate Chamber decorations..... 74
- Shadow in design..... 63
- Shaping machine..... 63
- Speaking tube..... 78
- Spires, church..... 30
- Staff decorations..... 72
- Stair, design for..... 90
- Staircase, design for..... 15
- Staircase, twin..... 92
- Steam, don't turn into sewer..... 74
- Stone, artificial..... 16
- Stone building, artificial..... 43
- Strains, graphic representation of..... 47
- Streets, asphalt..... 5

### T

- Temperatures, sick room..... 92
- Temple, Masonic, Kansas..... 5
- Temple, Odd Fellows..... 80
- Tensioning machine..... 48
- Thoroughness, value of..... 43
- Timber in damp places..... 43
- Tower, railway, Chicago..... 78
- Tree, lacquer..... 94
- Tub, laundry, "Albion"..... 83
- Tunnel, Washington St., Chicago..... 70

### U

- Utility and art..... 81

### V

- Vane, weather, Diana..... 81
- Vault, burial, design for..... 82

### W

- Wall board, Sackett's..... 90
- Wall ceilings, waterproof..... 19
- Wall finish, Diamond..... 78
- Water mains, steel, Toronto..... 19
- Waterproof wall coatings..... 19
- White House, builder..... 13
- Window frame, Schmidt's..... 18, 81
- Woods, colored..... 19
- Wood workers, improved..... 47

### Z

- Zinc castings, reporation..... 8



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NEW YORK, JANUARY, 1892.



A RESIDENCE AT BLACK ROCK, CONN.—VIEW IN HALL LOOKING INTO DINING ROOM.

[See colored plate and pages 2 and 6.]

## ogle

# THE DREXEL INSTITUTE OF ART, SCIENCE, AND INDUSTRY.

By the generous action of one of Philadelphia's noble citizens, a magnificent institution for industrial learning has been established in that city; and on December 17 the beautiful structure was the scene of a dedicatory exercises of a highly interesting nature.

The institute was built and endowed by Anthony J. Drexel, head of the great banking firm of Drexel & Co., and its scope and objects are outlined by him "are the extension and improvement of industrial education as a means of opening better and wider avenues of employment to young men and women."

The building was erected at a cost of \$200,000, and Mr. Drexel has endowed it with a fund of \$1,000,000. Mr. Chanancy M. Depew, of New York, made the dedicatory address. He was followed by Wayne MacVough, who presented, on behalf of Mr. Drexel, the deeds of trust conveying the building and endowment funds. Dr. James McAlister, president of the institute, responded.

The institute is located at Thirty-second and Chestnut Streets, West Philadelphia. The building is in the style of the classic Renaissance, constructed of buff brick with terra cotta ornamentation, the base being of rock-faced granite. A richly decorated portal in Chestnut Street, 30 feet wide and 45 feet high, forms the principal entrance. This admits to a portico of colored marble and paneled ceiling, which in turn opens into a spacious hall, the ceiling of which is supported by pillars of red Georgian marble. Beyond is a great central court, 65 feet square and the entire height of the building, and covered with a ceiling, the center of which is of stained glass. A double marble stairway leads to the upper floors and descends to the auditorium and the workshops in the basement. Broad galleries extend around the court on the second and third floors. These are supported and inclosed by arcades. From these galleries entrance hall, and central court are walled in marble; the arcades are faced with enameled bricks, and the dividing cornices are of terra cotta. The wood work throughout the building is of polished oak.

The offices, library, and reading room are on the first floor. There is a lecture room, with a seating capacity for 220 students; the auditorium is capable of seating 1,500 persons. A grand organ occupies the space back of the stage at the eastern end. The seats in the auditorium consist of rows of upholstered arm chairs. The class rooms are commodious, averaging from 44 by 34 to 56 by 44 feet. There are three physical laboratories on the second floor, the chemical laboratory being on the third floor, and the gymnasium on the fourth floor front. These connect with bath and dressing rooms. The photographic studios and laboratory are in the rear on the fourth floor. Cook rooms and lavatories, finished in marble and oak, are placed in all four stories of the building. The trustees' room is on the second floor. The shop for mechanical work is in the basement, as are also the steam and electric plants.

The object of the institute is the extension and improvement of industrial education as a means of opening better and wider avenues of employment to young men and women. The plan is comprehensive, the aim being to provide liberal means of culture for the masses by means of lectures, evening classes, library, and

museum. It is expected, however, that modifications will be made as the growth of the several departments and the experience gained in conducting them may require.

The work of the institute will be arranged under the following general divisions: 1, Art Department; 2, Scientific Department; 3, Department of Mechanical Arts; 4, Department of Domestic Economy; 5, Technical Department; 6, Business Department; 7, Department of Physical Training; 8, Normal Department for the Training of Teachers; 9, Department of Lectures and Evening Classes; 10, Library and Reading Room; 11, Museum.

Independent of the regular departments, students will have the option of taking such courses as they may elect and can advantageously pursue. Other departments will be added as the need or demand for them becomes apparent. A department of choral music will probably be instituted at an early day. A



THE DREXEL INSTITUTE OF ART, SCIENCE, AND INDUSTRY.

system of free scholarship will be established for the regular and special courses.

In order to guard against the abuse of the privileges of the institute, fees will be required, but the liberal endowment of \$1,000,000 is designed to make the charges moderate, and all monies received will be applied to the maintenance of the work of the institute. Deposits will be required to guard against loss through breakage in the laboratories. Students will be expected to supply text books, and those in the millinery and dressmaking classes will provide part of the materials used, but all tools and materials used in the workshops will be furnished by the institute.

## STAFF

It is estimated that about thirty thousand tons of staff will be used in the finishing of the buildings of the World's Columbian Exposition, this material being employed on nearly all the structures. The illustration given below represents one of the rooms of the Staff Decorative Co., who are now employing about two hundred men making this material, which is prepared and is furnished in shapes and forms suitable to be nailed to the frames of the buildings, inside and out. Fig. 1 represents the raising of the gristline mould from the east and Fig. 2 shows the fitting of the large columns for the Electrical Building. (Gelsoline is now more largely used than any other material for the moulds, although when there is no undercut, plaster, wax or sulphur moulds may be employed, or wood or metal forms. The staff itself is a composition of plaster

of Paris and fiber, with some other materials, as alumina, glycerine, destrie, etc., according to the special coating which is to be made or the kind of mould employed. To prevent brittleness, the material is cast around coarse cloth bagging or oakum. This material was first used in the Paris Exposition buildings of 1878. Its natural color is a murky white, but other colors may be produced by external washes, while the coatings may be made to accurately represent cut stone, rock-faced stone, mouldings, and the most delicate designs of every kind. For the lower portion of the walls the material is mixed with cement to make it hard.

## Durability of Redwood.

The Santa Barbara authorities recently investigated the lasting qualities of redwood, in order to decide whether to use redwood or stone for a bulkhead for the proposed esplanade.

The following are the questions and answers received in regard to Santa Cruz redwood:

From E. L. Van Klee: How long will this redwood last under ground or in salt water? Answer—Without any decay at all, it will last 25 years. Some will last much longer; 6 x 6 posts have been required perfectly sound after being in the ground over 30 years.

How long would it remain sufficiently sound to hold spikes, or until one-third of a 6 x 8 timber would decay, while constantly wet with salt water? Answer—In some cases 10 years. I am told by some that the kind of lumber described will last forever.

How long would 6 x 8 piles last, where they are constantly wet with salt water to four or five feet above ground? Answer—Salt water being a good preservative, I should think they would last 35 years.

How long would it remain sound in the ground where there is salt water, or where it would be alternately wet and dry? Answer—Thirty years.

How long would 2-inch plank last in a retaining wall, with earth more or less damp or wet on one side, and the other side dry, or exposed to the weather? Answer—Dampness does not seem to have any decaying effect on redwood. I should say such plank would last 30 years. All of this without any preservation. Coal tar as a preservative, applied hot, is as good as any I know.

From Charles Pierre: I have known some heavy black heart Santa Cruz redwood to lie under ground as long as 30 years without decay. This was in the case of a piece of 6 x 6 redwood used by myself for a gate post on my own premises.

Russell Heath: I have fence posts of redwood on my farm, the same having been in the ground 35 years, and they are sound, free from decay.

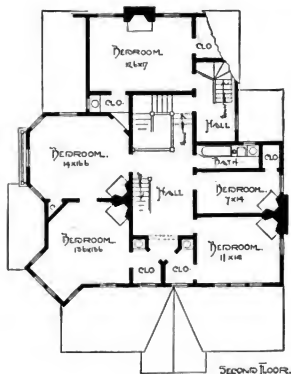
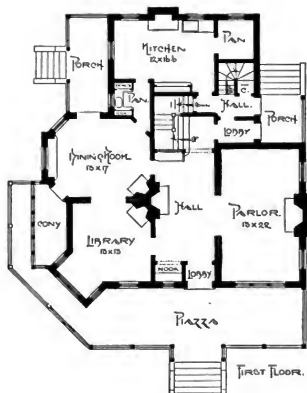
John P. Stearns: I know of a timber of Santa Cruz redwood that was 41 years under and in moist ground, and remained sound, free from decay.

John P. Teldar: I know of common redwood posts that have been set in Santa Barbara over 25 years, and are sound to-day.

Waxes the nickel trimmings of stoves get tarnished, make a paste of soda and ammonia and rub it on with a tooth brush. Remove the paste with a piece of old flannel and polish the trimmings with chamois. The miles in the doors of heaters and stoves can be cleaned with diluted vinegar.



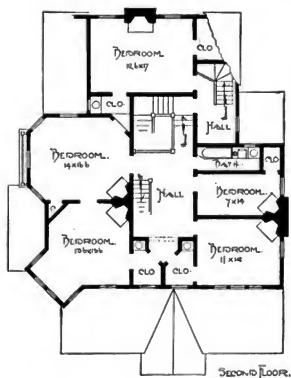
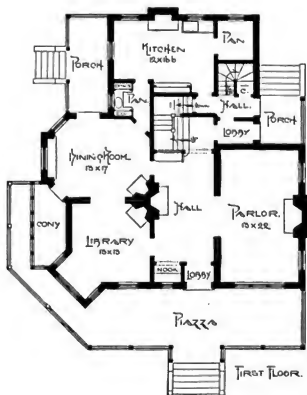
THE WORLD'S COLUMBIAN EXPOSITION—MAKING OF "STAFF" DECORATIONS.



[See page 2]

A RESIDENCE AT BRIDGEPORT, CONN.





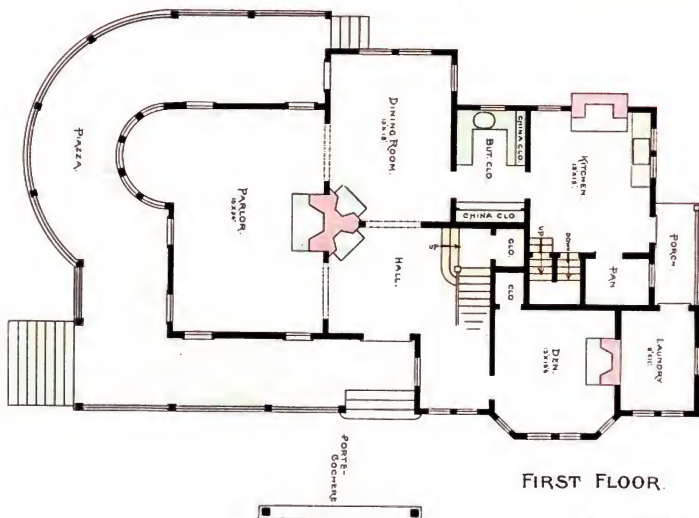
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A RESIDENCE AT BRIDGEPORT, CONN.





A RESIDENCE AT BLACK ROCK, CONN.

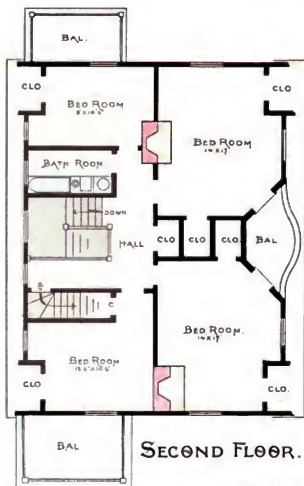


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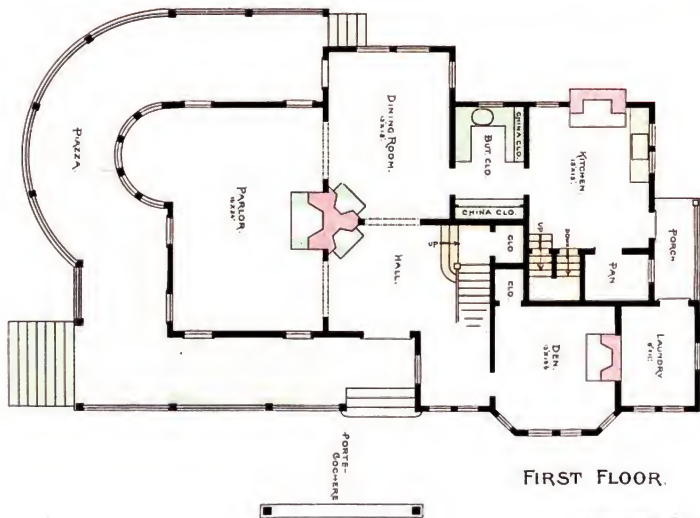


A COLONIAL HOUSE.





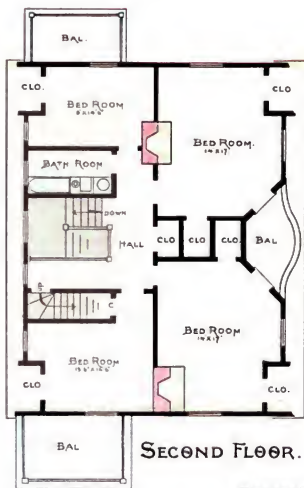
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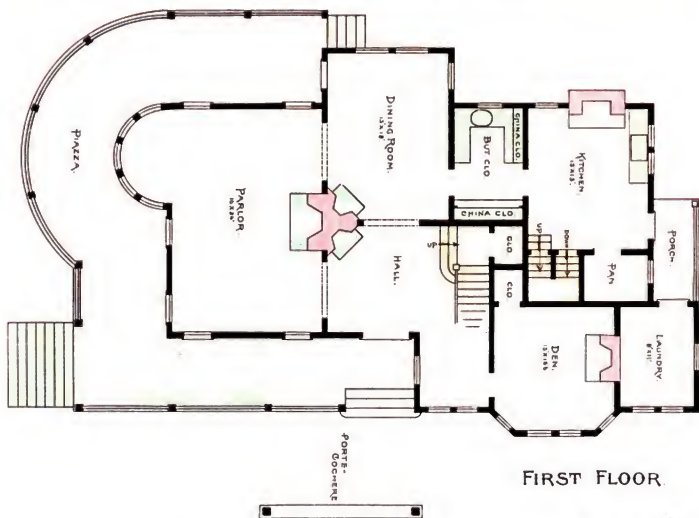


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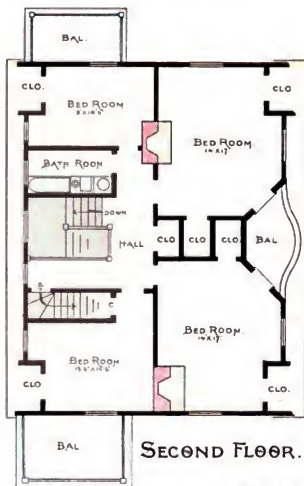
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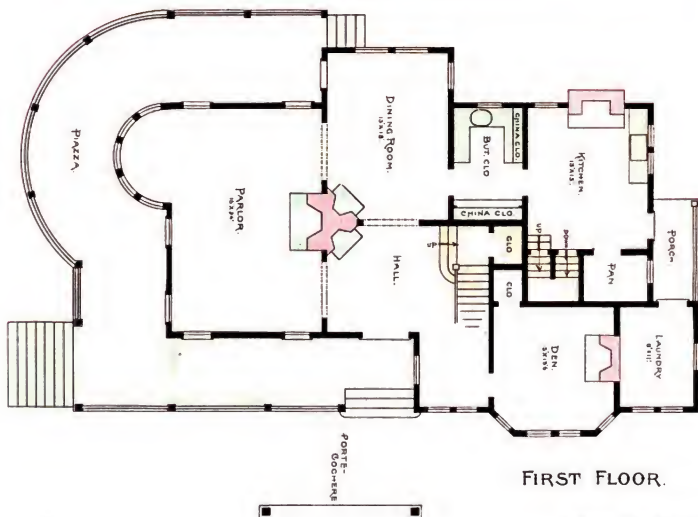
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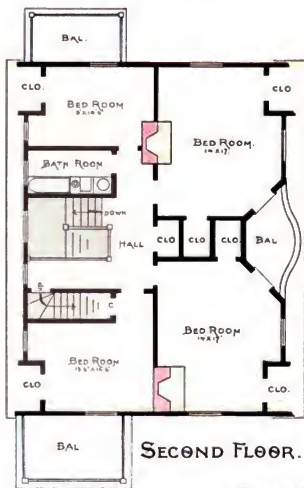
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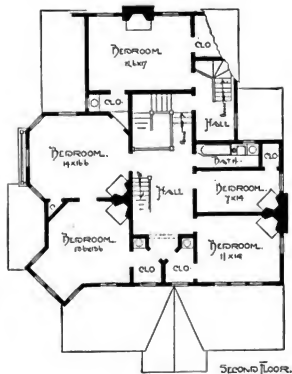
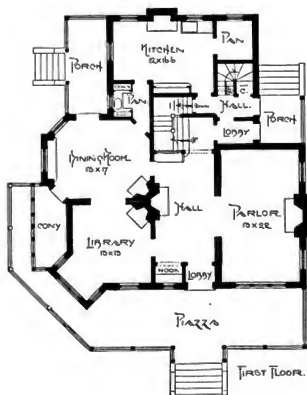


FIRST FLOOR.



A COLONIAL HOUSE.





[See page 2]

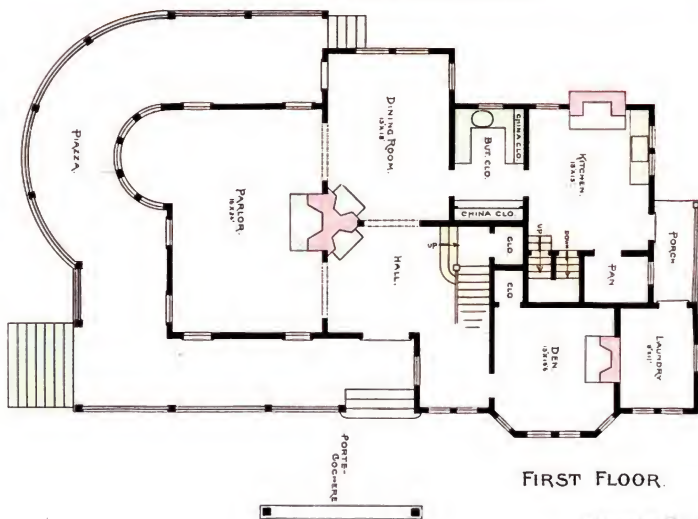
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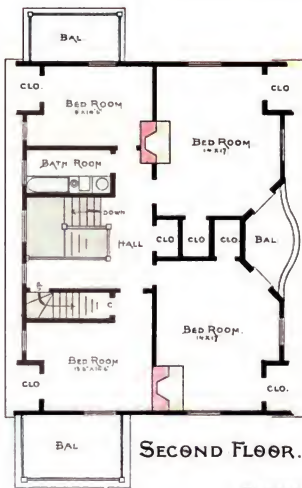


A RESIDENCE AT BLACK ROCK, CONN.





A COLONIAL HOUSE.



## THE PARSONAGE AT GARDNER, MAINE.

We publish on page 10 a design of substantial construction, with a pleasing exterior and a roomy interior, erected as the parsonage of the First Baptist Church, at Gardner, Maine. Dimensions: Front, 34 ft. 6 in.; side, 40 ft. 6 in., exclusive of piazza and shed. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 9 ft. 6 in.; third, 5 ft. Underpinning brick. The first story is clapboarded and painted light olive green, with trimmings of a darker shade; second story and gables are covered with cedar shingles, stained sienna. Roof, shingled and painted red. The interior throughout is trimmed with whitewood, finished natural. Hall contains an ornamental staircase turned out of ash. This hall, dining room and kitchen have hard wood floors, laid with birch in narrow widths. Parlor and library are separated by double sliding doors, the latter containing an open fireplace furnished with a tiled hearth and a hard wood mantel. Kitchen is walled and contains sink and a large well fitted up pantry. This house has the customary shed attached which is so frequently seen in this vicinity. There are four bed rooms, large closets, study and bath room on second floor and one room and storage on third floor, all complete. Bath room is walled and with brick. Connected contains furnace and other apartments. Cost \$2,500 complete. Mr. Lewis, architect, same place.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

## FIRST BAPTIST CHURCH, GARDNER, MAINE.

We present on page 11 a ground plan and perspective, reproduced from a photograph of the building, taken especially for the SCIENTIFIC AMERICAN, of the new First Baptist Church recently erected at Gardner, Maine. The church, as now completed, is one of the most picturesque and best appointed of its class. The aim has been to show, by constructional outlines, the general character of the building, to avoid all unnecessary ornamentation, and also to obtain the greatest accommodation for the amount expended. The underpinning is built of granite, and the building above this is of wood; the exterior framework being sheathed and then covered with cedar shingles, stained sienna, with trimmings painted light brown; roof shingled, and painted red. The auditorium is 44 by 45 and the school room 30 by 34. This auditorium has a seating capacity of three hundred, and an addition of one hundred and seventy-five in school room, the latter being connected with doors that slide up into roof. The interior is trimmed with cherry in a very handsome manner. The building is lighted with stained glass windows, with pleasing effect. The walls are colored with burnt sienna, giving it a very rich tone. The library is well fitted up, and is conveniently located. Stairs at front and rear lead to basement, which contains a kitchen, provided with the usual fixtures, and a large dining room. This basement contains, also, two large furnaces. Cost, \$9,000 complete, including furniture, decoration, furnaces, and organ, which cost \$1,750. Contract price for building, exclusive of the above, was \$4,000. John Calvin Stevens, architect, of Portland, Maine.

## A RESIDENCE AT BRIDGEPORT, CONN.

Our engravings, page 13, illustrate in perspective and plans the house built for Mr. J. H. Cogswell, located on Norman Street. Height of stories: Cellar, 7 ft.; first floor, 9 ft.; second floor, 8 ft. 6 in. Cellar under the whole house. Water closet and laundry in the cellar. Cellar bottom is cemented. Stone foundation, slate roof. The outside is finished with clapboards and shingles, with Venetian glass windows in front hall, and landing of stairs, and in the attic. Has electric bells, speaking tubes, etc. Hall, parlor, sitting and dining rooms are finished with whitewood, antique design. Hall, parlor, sitting and dining rooms are finished in cherry, with a dead finish. Kitchen finished in the natural wood. Fireplace in the sitting room, with tile hearth, faced with tile, brass rail, and ornamented linings. Second floor is finished in whitewood, same design as first floor and finished in the natural wood. Bath room is finished with ash. All plumbing is open. House is heated all through with hot air. Cost, \$5,000 complete. A Murray Jenks, architect. Our engraving was made direct from a photograph taken specially for the SCIENTIFIC AMERICAN.

## ON IRON RUST AND CAUSE OF FIRST

When oxide of iron is placed in contact with timber extended from the atmosphere, and aided by a slightly increased temperature, the oxide will part with its oxygen, and is converted into very finely divided particles of metallic iron having such an affinity for oxygen that, when afterward exposed to the action of the atmosphere from any cause, oxygen is so rapidly absorbed that these particles become suddenly red hot, and if in sufficient quantity will produce a temperature far beyond only by the action of the atmosphere. Wherever iron pipes are employed for the circulation of any heated medium, whether hot water, hot air, or steam, and the pipes allowed to become rusty, in close contact with timber,

it is only necessary to suppose that under these circumstances the particles of metallic iron become exposed to the action of the atmosphere, and this may occur from the mere expansion or contraction of the pipes, in order to account for many of the fires which periodically take

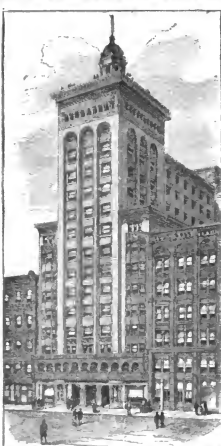


KANSAS CITY—THE NEW MASONIC TEMPLE.

place at the commencement of the winter season.—Boston Jour. of Com.

## THE GERMAN HOUSE IN CHICAGO.

The German House, which has just been commenced in Chicago, promises to be a truly gigantic undertaking of modern architecture, as will be seen from the accompanying illustration. The main object of the building is to provide a large German theater which can be used every evening, as well as the necessary halls for concerts and other meetings of the German population of Chicago, but at the same time to draw from the building itself the necessary funds to



THE GERMAN HOUSE, CHICAGO.

meet the expenses of maintenance, etc. The combination of these various objects could be accomplished only by the erection of a tower-like edifice, as the architects had to solve the problem of designing a building covering a ground surface of 1,000 sq. ft. and 165 feet high, without sacrificing the space of beauty,

and not forgetting that their work must be complete, the greatest care being given to the requirements of each separate room. As it was impossible to do any historical style of architecture to this extraordinary building, a new style had to be invented for this special case. The walls and arches are to be of stone or brick, with a frame of steel girders and beams, and a filling of hollow bricks. And for the sake of economy many windows must be provided, thus preventing the erection of large wall surfaces, that light and air may be supplied to all parts of the building. Antique halls, with pillars, Roman and Gothic pointed arches and the ornamentation of the Renaissance were out of the question; but nevertheless the architects hope to produce a structure which will combine beauty and usefulness.

That the details of the building may be better understood, we will state that the front on Randolph Street is 80 ft. wide and 181 ft. deep. In the basement are, besides the necessary rooms, rooms, etc., the cloak rooms, the meeting rooms for the theater, and also a restaurant arranged like a "rathskeller." On the ground floor is the main entrance, which is 40 ft. wide, and on each side of this a store to be rented. The theater will contain 1,375 seats, and will extend up through five stories of the front building, so that the seats in the parquette and galleries can rise one above the other, allowing the spectators to see the stage over the heads of those in front of them. The galleries are provided with iron supports, so that the entire auditorium will be free from pillars. On both sides of the parquette and the first gallery are passages which lead by the stage to the rear street, and which are also connected with lobbies. There are two lobbies for the parquette and one for each gallery, to save the spectators unnecessary steps during the intermissions. All the parts of the theater and stage, even the stairs, floors, galleries, etc., are made of metal or stone, so that it is impossible for the building to be destroyed by fire, especially as all the arrangements for the stage are of the very best, with a view to prevent any danger from fire. The stage is 71 ft. high; there are 19 dressing rooms connected with the stage. The auditorium and the stage are lighted by 1,400 electric lights, and are heated by warm air, delivered by apparatus which can also be used for ventilation.

Two other halls for balls, concerts, weddings, etc., are arranged in the twelfth story, being provided with reception rooms and dressing rooms. The eleventh story is given up to a social club, and contains a large dining room, besides a number of reading rooms, billiard rooms, card rooms, etc.; while the tenth story is used for a large restaurant with dining hall, small dining rooms, kitchens, etc. The side wings of the building are to be used for a hotel, and contain 121 rooms for guests, 35 bath rooms, and 10 rooms for servants, besides reception rooms and business apartments, such as are needed in large hotels. Five fans are provided for changing the air in the upper stories as well as in the basement, and these are driven by electricity; more than 2,500 incandescent lights are provided, and the building is heated by steam pipes.

For the foundation 100 piles were driven into the ground, and on three a frame of iron beams is to be erected. The wall of the theater will be three feet thick, and on this will rest the wrought steel supports for the eight stories above the theater. There will be four passenger elevators and one freight elevator in this remarkable building.—Illustrirte Zeitung.

As soon as an asphalt street is down, the traffic all goes there. Thus the asphalt pavement falls a victim to its own excellence. I have heard a great deal about that celebrated Appian Way and the other Roman roads. It is no wonder they stood, for the Romans used wooden wheels 15 inches on the face.

Years ago 1,500 pounds was considered a load for one horse on cobbles, with wheels 8 inches on the tread; farmers came in with 6 inch wheels. To-day 8,000 pounds is a common load for a pair of horses for my [A 500 pounds net per horse] with 24 to 32 inch wheels. Our present roads will not bear this traffic.—Bullock.

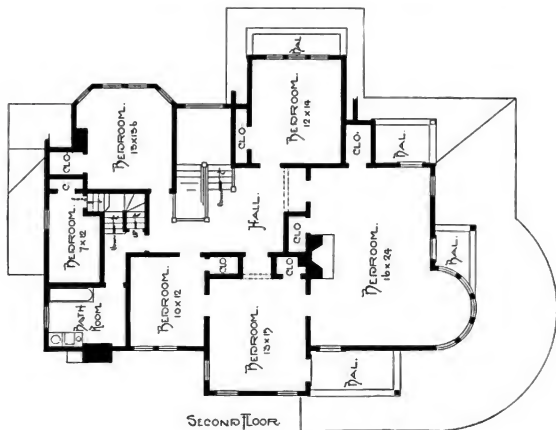
## PATENTS.

Messrs. Mess & Co., in connection with the publication of the Scientific American, continue to examine inventions and to act as Solicitors of Patents for Inventions.

In this issue of Invention they have for the first time, and now have prepared facilities for the preparation of Patents in Great Britain, Spain, France, Germany, Austria, Prussia, Russia, Italy, the United States, Canada, and Foreign Countries. Messrs. Mess & Co. also attend to the preparation of Copyrights for Books, Labels, Marks, and Designs, and Reports on Infringements of Patents. All business entrusted to them is done with special care and promptness, on very reasonable terms.

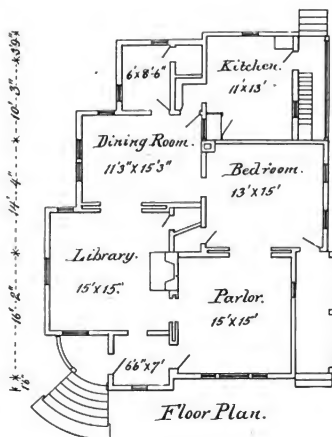
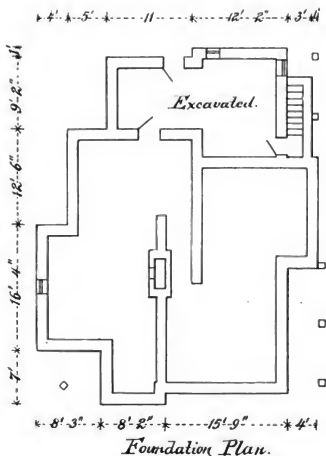
A pamphlet sent free of charge, on application, containing full information about Patents and how to proceed therein: directions concerning Labels, Copyrights, Inventions, Patents, Assignments, Infringements, Assignments, Registered in U.S. Pat. Office, etc. Also sent, free of charge, a treatise on Foreign Patents Laws, showing the great and small of securing patents in all the principal countries of the world.

MESS & CO., Mechanical and Patent, 81 Broadway, New York. BRANCH OFFICE—215 F St., Washington, D.C.



[See page 2.]

A RESIDENCE AT BLACK ROCK, CONN.



[See page 2.]

A COTTAGE AT RICHMOND, MO.

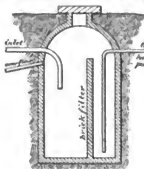
## TYPES OF CHAIRS, OLD AND MODERN.

The ancient chair which figures first on this sheet is supposed to be Etruscan. Executed immaribo, it is carved in low relief representing a procession of warriors, a boar hunt, etc. It is now in the Corsini Palace, Rome. Unsuitable from its weight for anything but a state chair, still it is an object of great beauty; and, from the fact that it must be one of the oldest chairs extant, obtains a prominent place on our page. The well framed chair next to it, with a pronounced Roman character, is a good type. Somewhat uncommon features are the perfectly straight arms and the arch and baluster work under the seat. It has an official appearance and would look well at the head of a table in a committee or board room. The "Georgian" is the antithesis to the formality of the last. The curved arms, bent supports, and widely spread legs give it a jaunty air which suggests familiar conversation and the comforts of a glowing hearth. It was to be seen at the recent Naval Exhibition. The design emanating from the "School of Handicraft" is as simple as it is effective. The seat is covered with tan brown leather, and a broad piece of the same material, embossed and well padded, makes a suitable finish to the formal back. The first two chairs below form good furniture for a hall. The "Shakopee" is a form familiar to us as being the product of the period to which our great national poet belonged. The high back seat next in order belonged to Thomas Wentworth, first Earl of Strafford, and has his arms carved thereon. It forms one of a set now preserved at South Kensington Museum. These two are, perhaps, not what would be called comfortable chairs according to present tastes; but then they were for use in times not given to the luxury of the present age—in an age, too, when life was passed more in the open air, and had little desire for that ease which now leads to many pelleted monotones. These latter bulge out into ever-varying forms, as fashion and a craze for novelty dictate. There is little doubt that if the old furniture designers were required to work for the present day, they would, without sacrificing the greater ease now demanded, give us something beautiful at the same time. The "King Charles," though of modern make, is a noticeable exception to our last remark, for it is as comfortable as it is dignified, being firmly made, well stuffed, and covered, moreover, with sumptuous tawny velvet with stamped pattern. Space will not permit us to do more than call attention to the interesting chair from the studio of Mr. J. R. Reid, the talented painter; and the

obtained, which, after a period of from six to eight hours, has hardened into an extraordinary solid gray compound. This is polished with an agate stone, when it assumes the brilliant white color of metallic zinc. The material is then applied to damaged or faulty size ornaments and utensils, the repairer effected being of a permanent nature. This cement is adapted for use on stone and wood as well as on metals and glass.

## HOW TO BUILD A RAIN WATER CISTERN AND FILTER.

In reply to K. and others we here give the form of cistern to be made of brick. Excavate the earth to the



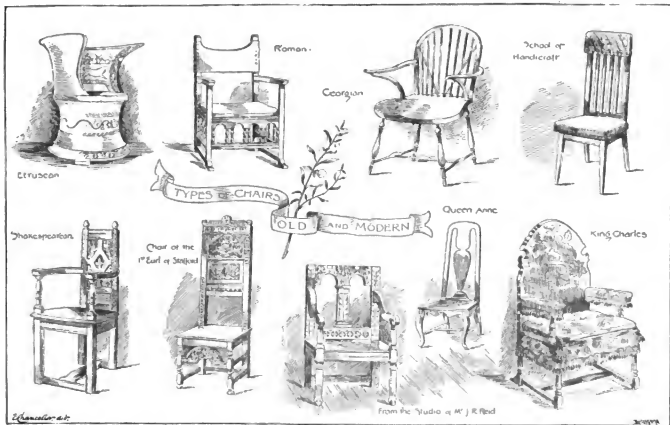
required depth and lay in the brick, using a mortar of the best Portland cement. Single brick thickness is sufficient. The neck of the cistern is to stand just at or slightly above the level of the ground. In laying the bricks, put cement behind the bricks, so that when finished the entire exterior of the cistern will be covered with cement. The dividing wall of single brick forms the filter through which the water from the large receiving chamber will find its way. The whole interior of the cistern, except the filtering wall, is to be plastered

## A CHURCH OF MODERATE COST, \$2,400.

On page 14 we illustrate a village church recently built at Oneida, N. Y., from plans by W. Irving Tillotson, architect, of the same place, for St. Paul's Evangelical Church. The outside dimensions of the auditorium are 33 x 40 ft., of the session room or small chapel 13 x 20 ft.; the tower is 9 x 9 ft. outside. Height of auditorium at sides 15 ft., in center 23 ft. A cellar 6 ft. 6 in. high extends under the whole building, the walls being of local blue quartzstone laid in courses above grade line. All the rough timber of the frame is of sound hemlock. The same is sheathed on outside with matched seasoned hemlock boards. The roof is boarded with square-edged hemlock boards, covered with building paper, and has sea green slate laid diagonally. The roof of the tower is covered with black slate with half hexagon ends. The cross at the terminal is of galvanized iron. All of the outside covering and trimmings are of white pine. The outside is vertically wainscoted around from the water table to the cap in line with the window sills. Above this, to the line of the gables, narrow beveled clapboards are used. The gables are shingled. The heads of outside doors and windows are gabled to harmonize with the inclination of the roof. The sashes are hung and have border lights of colored cathedral glass; the center lights are of figured obscured glass. The auditorium is connected with the vestibule by a fly door, also indirectly through the chapel, by passing through the sliding doors. The walls of the interior have vertical wainscoting as high as the window sills. Above this, together with the ceiling, two coats of Adamant plaster. All the interior trim is of North Carolina pine. The seats and railing along the platform are of oak, finished natural. The interior is lighted with gas; 250 persons can be comfortably seated in the auditorium and chapel. The outside has two coats of best white lead and oil. All the materials have been furnished and the labor performed for the sum of \$2,400.

## Bird Tracks in Stone.

Mr. E. F. Church, editor of the *Newtown Enterprise*, Newtown, Pa., during a recent excursion over the border line into New Jersey, found a stone having bird tracks indented in its surface. Mr. H. O. Woodman, of Longhorne, Pa., geologist, says: "The stone is of Juni Triassic shale, and was found in the valley of the Delaware River, near Frenchtown,



quaint and feelingly designed "Queen Anne," which possesses a charm all its own.—*Building News*.

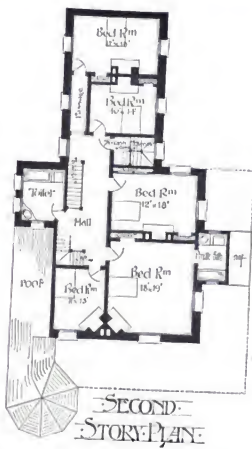
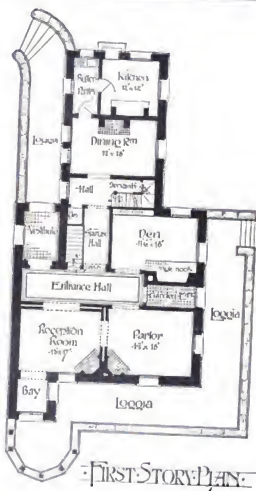
## Preparation of Blue Castings.

According to *Iron*, flasks in blue castings for ornamental work, or the like, can be concealed by the following preparation: A water glass solution of 30 de grees B. is well stirred with Spanish white, adding zinc powder (so-called zinc gray) until a thick plastic mass is

with cement, using Portland cement one part, clean sharp sand two parts. The receiving chamber will need to be occasionally cleaned. For the first few months of use the water will be rendered somewhat hard by the cement, but this will pass away, and after that pure soft water, suitable for all domestic purposes, will be enjoyed. Convenient dimensions for a small family are 6 ft. diameter, 8 ft. deep. But the dimensions may be made to suit.

N. J., a few miles below the northwestern limit of the Juni-Triassic formation. The tracks are 14 inches apart, 3 inches long, and 3 inches wide, and they probably belong to Hitchcock's order of "Brontozoum." The locality in which it was found seems to have been an extensive shore line in Triassic times, as ripple marks, sun cracks, as well as other fossil footprints, abound, and the geologist will be amply repaid for a careful examination."

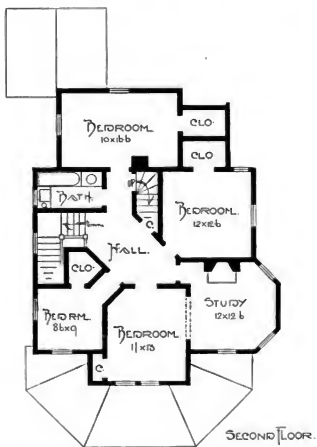
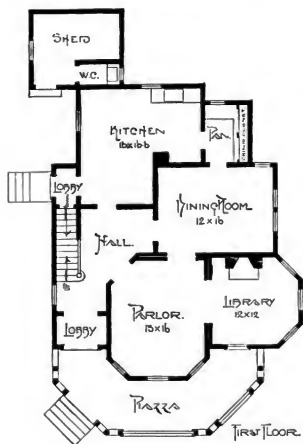




[See page 2.]

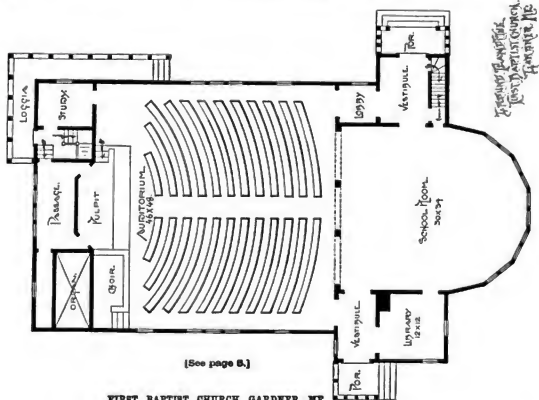
A MOUNTAIN COTTAGE





[See page 8.]

THE PARSONAGE AT GARDNER, ME.



## A RESIDENCE AT ROCHESTER, N. Y.

The plate herewith presented represents the beautiful dwelling of Geo. C. Hollister, Esq., on East Avenue, Rochester, N. Y. Mr. James Cutler, architect. The building is of light red stone of very agreeable tint. The internal arrangements and appointments are of the most excellent description. Our plate was prepared direct from a photograph of the building by Miss Catherine Barnes, an amateur photographer of national reputation.

## Steel Water Main in Toronto.

In the last annual report of the superintendent of the Toronto (Canada) water works, Mr. W. Hamilton, there is an interesting description of the new steel conduits which have been constructed to increase the supply of water taken from Lake Ontario through the old 5-foot cast iron and 4 feet wood intakes. The description was prepared by Mr. W. C. Brough, the engineer of the department, and the following abstract is taken from the *Engineering Record*: The new submerged conduits are two in number, one 40 inches in diameter and 4,000 feet long, the other 60 inches in diameter and 6,027 feet long. The 40 inch pipes are made in lengths of 36 ft. 9 in., and the flexible joints are 4 ft. 6½ in. long. These dimensions with the

flanges that encircle the ball, thereby separating the ball end from the socket end. The ball end was then riveted to one pipe, and the socket to the next. When the riveting was completed, the parts were placed in position with the ball lifted off the bottom to aid in adjusting the socket. Divers fastened the flanges together again as soon as the socket was placed in position. The 60-in. pipe began with a flexible joint. As the lengths of pipe were laid, the forward end of each was raised by blocks, so that when from five to fifteen sections had been rigidly riveted, their weight caused them to sink to the proper grade—the joint permitting this motion. When this occurred another flexible joint was used, thereby taking the leverage off the preceding pipes, and preventing further settlement.

## The Builder of the White House.

It was James Hoban—the friend of George Washington—to whose genius we owe the White House and other public buildings in the district, who was employed by the year, at the suggestion of President Washington in 1792, at an annual salary of 300 guineas, continuing until 1798, when he was appointed supervising architect of the United States Capitol, admittedly the building par excellence of the United States. James

\$35. Suppose it lasts but three years, we would have a cost of \$14.33 per annum for good paint and \$30 per annum for cheap paint.

This illustration shows, therefore, that durability is the main factor in the paint, especially as the principal motive of painting is to preserve the material over which the pigment was spread. What, therefore, becomes the main safeguard for that all-important quality, durability? To all practical men the natural answer will come: The use of that article which thus far has proved itself most effective in battling against the elements—pure linseed oil. That is the life of a paint, and it cannot be supplanted by fish oil, resin oil, emulsions, soap mixtures and the like. Therefore ask your manufacturers to guarantee beyond a shadow of doubt that the vehicle employed in their house paints is "linseed oil, pure, simple and unadulterated."

## World's Fair Notes.

It is the intention of the Indian Bureau of the United States government to make a complete Indian exhibit, occupying perhaps two acres. Representatives of all the leading tribes, especially those of a distinctive type, will be shown, together with their habitations, industries, etc. The Navajo will show their wonderful skill



A RESIDENCE AT ROCHESTER, N. Y.

4 feet pipes are 55 ft. 9 in. and 4 ft. 6 in. respectively. The steel used is ¾ inch single riveted Scotch boiler plate. The flexible joints have a body of the same material as the pipes, with a cast iron ball riveted on. A curved rim is riveted inside the socket, and filled with soft pig lead, which projects ¼ inch beyond the rim, and works on the planed surface of the ball.

In the total length of the 48-in. pipe, there were 65 of these flexible joints used, on account of the irregularity of the bottom of the harbor through which they extended. In places rock had to be blasted and dredged to a depth of 8 ft. in order to conform to the proper grade and to give a depth of 14 ft. of water over the pipe to satisfy the requirements of the Harbor Commissioners. In the 6,027 ft. of 60-in. pipe, only 15 joints were considered necessary, as the trench dredged was in soft clay or sand, and could therefore be kept comparatively level. The 48-in. joints were riveted directly to the pipes. Where they were unnecessary, there was a steel sleeve riveted on, joining the two sections, and making a total length of one pipe of about 120 ft. The connections of the 60-in. pipes and joints were made by means of cast iron flanges having a face projection of ¼ in. Inside this was a ¾-in. pipe packing, which was held in position by the face projection on the inside and bolts on the outside; being first laced against one flange with wire.

The majority of the bolted joints were made under water by divers after the pipe was nearly in its final position. The 48-in. joints, before being riveted to the pipes, were taken apart in the center, by unbolting the

Hoban, born in Kilkenny County, Ireland, taught the profession of an architect in Dublin and was awarded a medal by the Dublin Society. In 1790 he left Ireland for Charleston, where he first settled. When Washington City was contemplated, Henry Laurens, of South Carolina, long a State captive in the Tower of London, gave Hoban a letter of recommendation to George Washington. After filling various high political positions, Hoban died in 1831, leaving considerable property to his children.

## What Constitutes the Best Paint.

In a paper recently read before the Northwestern Railroad Club by Mr. J. P. Seymour, some useful hints are given which users of paint will regard with profit to themselves.

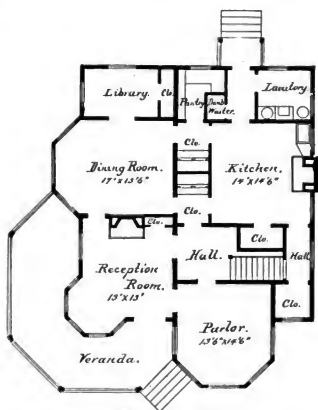
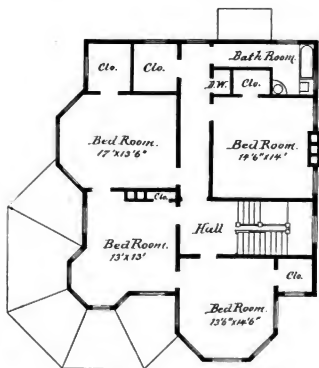
The paint that for the longest time will put off the necessity of repainting is the paint which most in the nature of things exacted itself to the use as the most economical, which faced before a body of men like the Northwest Railroad Club is best illustrated by this calculation. Suppose a small depot along the line requires 20 gallons of paint. If the material selected for this work was cheap, 75 cts. per gallon, the cost would be \$15; cost of application, \$25; making a total cost of \$40. Such a paint would last at most two years, or a cost of \$20 per year for that station. Now suppose this material selected for this station was the best paint. Twenty gallons would cost, at \$1.30 per gallon, \$26; the cost of application the same as that of the cheap material, \$25; making a total cost for the best paint of

in blanket weaving, the Zunis, whose customs have been a study for years, will make pottery and live in a "hogan," as they call their peculiar residences. The Plates are to make water bottles of rushes. Then there will be a great collection of relics, weapons, and utensils. There will also be in operation a model Indian school under competent teachers. The will be painted and is feathered altogether will be contrasted with the civilized or semi-civilized Indian of today. It is believed that foreigners particularly will be interested in the Indian exhibit.

The Patent Office will exhibit a comprehensive array of models to illustrate the wonderful progress of mechanical civilization. One group of models will show the progress of the printer's art from Gutenberg's crude invention to the latest rotary perfecting and folding printing press, capable of turning out newspapers at the rate of many thousands per hour. Other groups will show the development of the steam engine, sewing machine, agricultural machinery, application of electricity, etc.

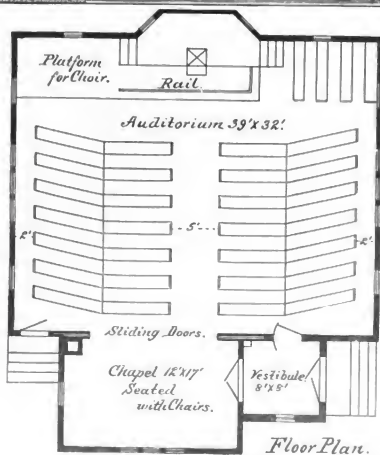
## PLANS AND SPECIFICATIONS.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MESS & CO., 261 Broadway, New York.

*First Floor Plan.**Second Floor Plan.*

[See page 8.]

A RESIDENCE AT BRIDGEPORT, CONN.



A CHURCH OF MODERATE COST.—[See page 8.]

**A HEAVY TWELVE INCH STANDARD MOULDER.**

The illustration represents a very heavy four-sided moulder designed for large work. It is especially adapted for all kinds of heavy building material, oak work, mantel work, etc. The side heads, with their spindles, raise and lower with the table, and both inside and outside spindles are adjustable vertically and horizontally, while in operation, by hand wheels on the front side below the bed. The under head is also adjustable laterally. These are great improvements on moulders, and will be appreciated by all first-class operators. There are chip breakers to every head, and in this there is a marked advantage, as there can be no tearing on the heads, the way these improvements are rigged. The feed is extra powerful, and consists of

gears in this line may, therefore, find something to their taste in the accompanying illustration, which is an original design specially made for the Willer Manufacturing Co., of Milwaukee, Wis., and appearing in their catalogue, No. 8. This company has made a specialty of fine interior hard-wood work for first-class buildings, and has finished the halls and staircases complete of many beautiful residences.

**Hot Water vs. Steam Heating.**

An interesting essay under this title, written by Leicester Allen, M.E., has recently been issued by the Sanitary Publishing Company, of New York, and is mailed to any address for the price of ten cents. The author has had an extensive practical experience

with brick suitable for pavers, its testing, laying, cost, and advantages, list of cities using such pavement, etc. It is said that the use of brick for paving is no longer an experiment, Dewater, Illinois, one of the first cities to use brick for this purpose, having now about ten miles of brick-paved streets, which it is said are giving great satisfaction. Brick for this purpose is made of such density as to be practically impervious to water, and should be very tough and thoroughly vitrified.

**SCHEIDT'S IMPROVED WINDOW FRAME.**

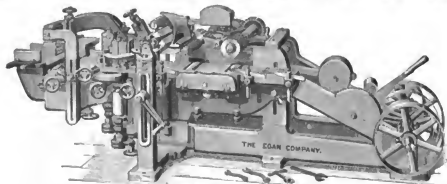
This patented improvement was illustrated and described in our last issue, but an incorrectly worded sentence rendered the description somewhat erroneous, although the illustration plainly represented the efficiency and simplicity of the device.

The parting rail in the sideways, as shown in the accompanying picture, is placed in a slightly diagonal position, so that when the sashes are closed they will be firmly wedged in position to exclude air and prevent rattling, while in the upper portion of the sideways of the lower sash and the lower portion of the sideways of the upper sash a spring is placed in a recess in the parting rail, by means of which, when either sash is pushed to the wider portion of its sideways, it will be held at any position in which it may be left. The obvious convenience and the extreme simplicity of the device will be readily apparent. The improvement has been patented by Mr. August Schmidt, of No. 1709 Amsterdam Avenue, New York City.

**Value of Thoroughness.**

Accuracy in details is the one thing lacking with many mechanics as well as business men. They perform their tasks in a perfunctory way and are satisfied with general results. Thoroughness is one of the greatest needs of this superficial age. Everything is done in a hurry and every one seems possessed with the idea of covering the most ground in the shortest time. Work is estimated by its surface measurement rather than by breadth and depth. The tendency is a mischievous one and should be guarded against. The man who masters the details of his profession builds upon a foundation that will withstand the severest tests of time and circumstances.

THE WESTERN MINERAL WOOL CO., recently removed to the "Rockery" building, Chicago, announce the erection of an extensive plant, to be completed January 1. The company has very extensive facilities for the manufacture of insulation, deadening, fire-proofing, pipe and boiler covering, and asbestos materials, and is prepared to submit estimates or make contracts for the largest possible undertakings.

**THE EGAN COMPANY HEAVY STANDARD MOULDER.**

four rolls, two in the bed and two above, all driven by powerful gearing, and the expansion for driving the lower rolls is very perfect. There are two feeds on the machine. The upper feed spindles are hung on links in such a manner that the feed rolls raise up parallel, giving the feed rolls a full bearing on the board the entire width of the piece. By an improved system of weighting, the feed rolls can be instantly raised up, allowing the operator to slip the board back. For further information address the builders, The Egan Co., Nos. 209 to 220 West Front Street, Cincinnati, Ohio, U. S. A.

**A STAIRCASE AND HALL DESIGN.**

A house built for a particular individual or family may vary in many particulars from the regular and conventional styles on which builders plan groups of houses to put on the market without any addition to the cost. And all such variations, provided they be in good taste and made with a proper sense of harmony and proportion, add greatly to the charm of a house. Perhaps in no other one particular is there so great an opportunity for specialization in the construction of a house as in the planning and arrangement of the main hall and staircase. Those who are looking for sug-

gestions in this line may, therefore, find something to their taste in the accompanying illustration, which is an original design specially made for the Willer Manufacturing Co., of Milwaukee, Wis., and appearing in their catalogue, No. 8. This company has made a specialty of fine interior hard-wood work for first-class buildings, and has finished the halls and staircases complete of many beautiful residences.

Messrs. LANE BROS. of Poughkeepsie, N. Y., report that their business never was better than it is at present. The "Lane Barn Door Hangers," as well as their parlor door hanger, are now well known in all sections of the country, and the sales are said to be constantly increasing. A recent addition to the works of the firm has just been completed.

"BRICK PAVEMENTS" is the title of a most interesting book of seventy-five pages prepared by Messrs. J. W. Penfield & Son, of Willoughby, Ohio, for the use of their customers and others interested. The firm are manufacturers of a large variety of clay-working machinery, and in this book they treat of the kind of

**A STAIRCASE AND HALL DESIGN OF THE WILLER MANUFACTURING CO.**



## THE IMPROVED WARNER DOOR HANGER.

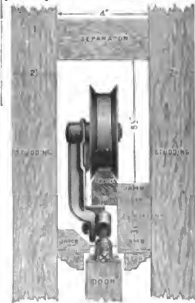
The new single track parlor door hanger shown in the accompanying illustrations is designed to be very simple in its construction, and in the method of putting up. It is manufactured by Messrs. E. C. Stearns & Co., of Syracuse, N. Y., and to avoid noise, while still giving strength and durability, metal wheels are used and well seasoned hard wood track. The wheels are  $3\frac{1}{2}$  in. in diameter, and the bearings are lined with anti-friction metal. The axles are  $\frac{7}{8}$  in. round steel, carefully turned, supported in upright frames of novel form to insure the perfect centering of the door when suspended. The base plates are attached to the top of the door, without cutting or mortising, and the nuts attaching the adjusting screw to the frame are so made as to accommodate themselves to any desired vertical adjustment of the door. The adjusting screws are placed at the upper corner of the door, where the adjustment can be most conveniently effected. This new

96 inches, or, in other words, the distance between column and saw is 48 inches. The frame is cast in one massive piece, with a rectangular cross section, so that it is capable of withstanding a strain equivalent to one and a half tons on the wheels' axis, without affecting the saw guides. The wheels are 48 inches in diameter and have a  $3\frac{1}{2}$  inch face. The shafts which support the wheels are of unusual diameter and length. The upper wheel shaft is  $2\frac{1}{2}$  inches in diameter and revolves in two boxes with a total bearing surface of 12 inches. The lower wheel shaft is 2 inches in diameter and revolves in two boxes with a total bearing surface of 18 inches. The iron table is large and heavy, and in proportion to the machine. It pivots in a semi-circular bearing, and can be adjusted to any angle in a moment's time and held rigidly in position by a new and patented device.

The graduated friction feed works are mounted on a swinging frame hinged to column, and consist of four

and other wood-working machines address the Cordesman Machine Co., 34 to 36 Butler street, Cincinnati, O., U. S. A.

A good fertilizer for the window garden is a tablespoonful of guano, dissolved in a quart of lukewarm water and applied around the roots, once a week. The amount given will be enough to fertilize half a dozen plants in pots of five or six inch size.



THE WARNER DOOR HANGER-END VIEW.

hanger gives a perfect alignment. There is no mortising or cutting of studding, no rivets are used, all the main parts being solid, and no boxing is required.

## AN IMPROVED BAND SCROLL AND REAW.

The engraving shows an improved patent band sawing machine, for scroll work and reawing, designed principally for heavy work, such as is required in ship building, car, carriage, wagon, and agricultural implement works. It can also be used to great advantage in furniture and organ factories, planing mills, etc. This machine will carry a saw  $\frac{1}{4}$  inch wide as well as it will a saw  $3\frac{1}{2}$  or 5 inches wide. Consequently it will answer for light as well as heavy work. It will take in 24 inches under the guide, and will saw to the center of

4 inch (power driven) strongly geared feed rolls, controlled by hand levers placed at side of machine, where the operator stands, and the speed of feed can be varied from nothing up to 80 feet per minute. The rolls are self-centering and will center a board or timber of any thickness up to 10 inches thick and 24 inches wide; one side of the double feed rolls can be made stationary, while the other side yields, thus enabling the operator to cut a slab  $\frac{1}{4}$  or  $\frac{1}{2}$  inch thick off a board of any thickness up to 5 inches. Two blades are furnished with each machine, one blade 8 inches wide for splitting, the other  $\frac{1}{2}$  inch wide for scroll work. The tight and loose pulleys are 24 inches in diameter by 6 $\frac{1}{2}$  inch face, and should make 600 revolutions per minute. For further particulars about this

## Artificial Stone.

Ten parts of siliceous acid, powdered and freed from impurities, are mixed with 90 parts of water and 100 of quicklime, all by weight. One hundred parts of the product are mixed with 100 parts of sand and 5 parts of magnesia or fluor spar, and the mass moulded as desired. The articles are allowed to dry for 12 to 24 hours, and subjected to steam pressure under 10 atmospheres pressure for 48 to 72 hours, after which they are treated with boiling saturated calcium chloride solution at a pressure of 10 atmospheres for 6 to 12 hours. They may then be dried by air or the circulation of steam. Marble, magnesia, magnesium limestone, etc., may be substituted for the sand. The stone thus formed are said to resemble marble, sandstone, granite, etc., closely, to be fireproof, and to resist the action of the weather as well as natural stones.—C. George, Berlin, Germany.

## AN IMPROVED FLOUR BIN AND SIEVE.

The receptacle for flour shown in the illustration is designed to be also an aerator and sifter, having a reel inside the bin to agitate the flour and make it light, thereby improving its quality, and preventing mould or rustiness. It can be kept on a pantry table or shelf, and by its use flour enough for a baking can be sifted in a moment, without the employment of the extra scoop, sieves and other receptacles generally required.

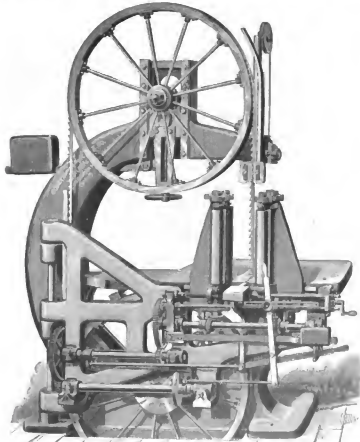


It is made in sizes to hold 25, 50, and 100 pounds, by Messrs. Sherman & Butler, 36 and 38 West Lake Street, B. Chicago, Ill.

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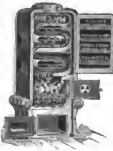
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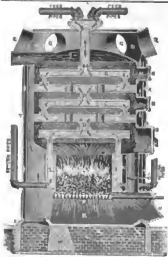
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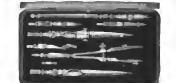


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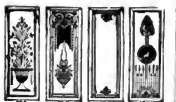
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Drops, etc.

(Continued from page iv.)  
(6) K. W. R. writes: Have you any  
saw for killing a small fly insect or house which  
works to make lumber, both in piles and in buildings,  
where there is a great deal of it? This fly is very  
small, light brown in color, and hovers one  
sixty-fourth and one thirty-sixth of an inch in diam-  
eter and measures of an inch long. It is very  
rapid, and works to eat the lumber, pine and  
cedar, and in the board floors of our warehouses,  
where there is much walking and going to and fro  
about the floor. It is the most common of all insects  
about the house. They will eat the floor and the  
boards. A great many have heard of them, but they  
have not seen them. We have noticed the  
lumber with some substance on it, both hot and  
cold, and have also seen the pests and others. It may  
be that the kill of a great many of the living insects,  
but if so, we do not kill the eggs, and the insect seems  
to increase with remarkable rapidity. A. Reply by  
Prof. C. V. Riley:—The small fly insect or house which  
works in oak lumber, as described in your letter, is a  
common and widely distributed pest bearing the sci-  
entific name of *Lepidus erichsoni*, Muls. It is properly not  
a fly but a small beetle belonging to the family Psephenidae.  
The department is frequently in receipt of letters relat-  
ing to damage by this insect. It is rather a difficult  
insect to control, and the remedy I have frequently ad-  
vised, and which is the only one which seems to promise  
success, is to paint or coat the lumber, buildings, or  
wooden timber with kerosene. The kerosene works upon  
the surface of the wood, and the kerosene will penetrate  
sufficiently to kill the beetle and early stages. Because  
of course may be used in line of lumber, but this substance  
will not be effective on account of their more rapid  
reproduction.  
(7) P. F. R. says: Kindly inform us  
what dimensions you would recommend for a round  
chimney to get the best efficiency from a 2,500 horse-  
power steam plant, tubular boiler. The location of  
the proposed chimney is fairly good. It will not extend  
over a hill, it is not a valley, nor is it surrounded by  
buildings. A. The size and height of a chimney for our  
large power should be computed from an assumed  
consumption of coal per horse power, which will de-  
pend very much upon the kind of engine and condi-  
tions of better for economy of steam production. If an  
assumed consumption of 2 pounds coal per horse power  
is used, your chimney should not be less than 1 foot  
diameter (round) and 150 high.  
(8) J. M. asks the different speeds a  
wood-turning lathe ought to run to turn the following  
work: a column 8 in. diameter, a wheel 3 ft. diameter  
and a small job 1 in. diameter. A. Base all calculations  
on a peripheral speed of 200 ft. per minute. This is as  
much as the steel will stand. For the three cases cited  
this would give speeds of 260, 15, and 1,500 revolutions  
per minute respectively.  
(Continued on page vi.)

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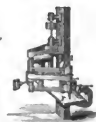
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Ohio Plaster Co., Cleveland, Ohio.

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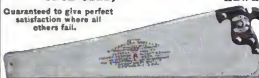
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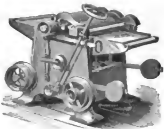
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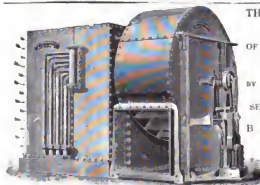


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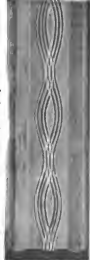
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AND BUILDERS

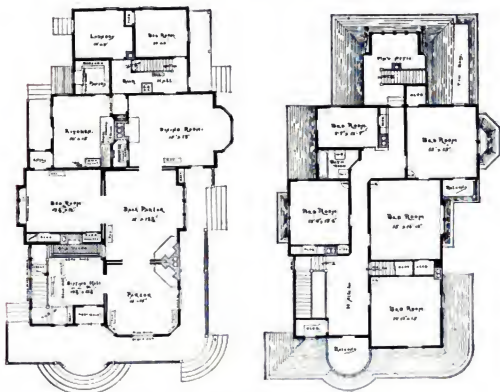
EDITION.

Vol. XLII. Subscription, \$3.50 a Year.

NEW YORK, FEBRUARY, 1892.

Single Copies, 25 Cents.

No. 2



A RESIDENCE AT CARTHAGE, ILL.

[See page 19.]





with whitewood. Hall, parlor and dining room are stained cherry; the two latter having bay windows and open fireplaces trimmed with tiles and hard wood mantels. Kitchen and pantry are wainscoted and fitted up complete. There are three bed rooms, den, and bath room on second floor, and two bed rooms and storage on third floor. The parlor and den are trimmed with whitewood, also, and are stained cherry. Bath room wainscoted and replete. Cemented cellar contains furnace, laundry, etc. Cost \$23,000 complete. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

#### RESIDENCE OF MR. WILLIAM DE KART, CARTHAGE, ILLINOIS.

This handsome dwelling, designed in the style of modern Romanesque, consists of eight rooms on the first floor, and cost complete about \$9,000. George W. Payne, architect, Carthage, Ill. The front entrance leads through a vestibule into a sitting or reception hall with tiled floor, open grate, and an arched recess. Connected with this by sliding doors is the parlor, with passage leading from the rear one to a large bed room, the kitchen and a pleasant dining room, in which is a large bay window and a cozy fireplace. This room is also entered from the side piazza. The main stairway, rising from the sitting hall, is of red oak, beautifully moulded, with three stained glass windows as shown in the illustration. The hall and parlors are finished in red oak, the kitchen and dining room in Southern yellow pine, and the remaining rooms in white pine. The first story is eleven feet and the second nine feet high. The attics are finished off to correspond with the other portions of the structure.—*The Architectural Era.*

#### A RESIDENCE AT BELLE HAVEN.

We present on pages 34 and 35 a residence, colonial in treatment, recently erected for Mr. Charles A. Moore, at Belle Haven, Greenwich, Connecticut. It has a broad and spacious piazza, porte cochere, bay windows, and an interior arrangement showing numerous large rooms. The underpinning is built of local bluestone, laid rock faced; the building above this is sheathed, clapboarded and painted colonial yellow, with ivory white trimmings. The circular arches and balustrade to the piazza are shingled and painted similar. Roof shingled. Dimensions: Front, 65 ft.; side, 48 ft., exclusive of piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. Main rooms on first floor have 6 ft. wide entrances (with sliding doors), so that they can be thrown into one suite. Main hall, 14 ft. x 29 ft. 6 in. It is in colonial style and finished in antique oak. The hall is finished in antique oak, the ceiling is beamed, forming deep panels. Fireplace has a tiled hearth, with wrought iron trimmings and a hard wood mantel. This hall, also, is provided with a paneled divan, and staircase with carved newels, which is lighted effectively with large stained glass windows. Plaster throughout are of hard wood. Drawing room is finished in ivory white and gilt, the floor being painted in cream white. Fireplace has a hearth laid with ivory white tiles and a mantel of exquisite design. Dining room is trimmed with antique oak and ash as provided with a mantel of similar work. Billiard room trimmed with whitewood, contains a brick fireplace, with hearth laid with same. Kitchen and its apartments are trimmed with yellow pine, finished natural with hard wood and are fitted up complete in all their appointments. There are five bed rooms, two large closets, one bath room on the second floor, and two trunk rooms and four bed rooms on third floor. These apartments are trimmed with whitewood, finished natural with hard oil. Bath room is wainscoted with white English tiles, and is furnished in an excellent manner. Cemented cellar contains laundry, furnace, and other apartments. It is latined and plastered throughout. Cost, \$14,000 complete, estimated. Messrs. Boring, Tilton & Meigs, architects, New York. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

The church had been erected, the usual dinner was given, and at the conclusion the health of the builder was proposed, who, in response, significantly replied that he was "more fitted for the scaffold than for public speaking."

#### A COLONIAL RESIDENCE.

On page 27 will be found an engraving and floor plans of a residence, colonial in treatment, erected recently for James Sawtell, Esq., at Brookline, Mass. Dimensions: Front 30 ft., side 71 ft., not including front porch. Height of ceilings: Cellar 8 ft., first story 10 ft., second 9 ft., third 8 ft. Underpinning is built up with Chestnut Hill stone, laid rock-faced ashlar. The superstructure above is of wood, covered with clapboarding and painted colonial yellow with white trimmings. Roof shingled and painted red. Blinds painted bottle (Brazilian) green. The several rooms communicating as they do make a most attractive vista of the entire floor. The first floor is handsomely finished. The reception hall and dining room are trimmed with antique oak, the walls and ceilings being wainscoted and elaborately paneled. The broad staircase, with carved newels, antique mantel, and paneled divan, are the features of hall. Floors are laid with hard wood and are highly polished. Parlor and music room are treated in a delicate manner with white (china) gloss and a little gilt, the former having a fireplace, furnished with white enameled tiles and a mantel elegantly carved. Library is trimmed with mahogany and fitted up with bookcases, fireplaces, etc. Kitchen and its apartments, conveniently located, are trimmed and wainscoted with hard pine, finished natural. The butler's pantry is of sufficient size to contain the usual fixtures, dresser, closets, box, etc. The second floor contains four bed rooms, large closets, den, and bath room, besides servants' bed room and bath. These apartments are trimmed with various kinds of hard wood respectively.



A RESIDENCE AT CARTHAGE, ILL.—VIEW IN HALL.

Both rooms are wainscoted and furnished in the best possible style, according to the fashion of the day. Den and storage on third floor. Cemented cellar contains laundry, furnace, and other necessary apartments. Heated by steam. Cost \$19,000 complete. Mr. Willard T. Sears, architect, Boston, Mass. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

#### Waterproof Wall Coatings.

Dr. T. Koller, of Minnisc, has published in *Glasers' Anzeiger* some useful information which he has collected with reference to the waterproofing of brick work, concrete, etc. He strongly recommends whitewash containing a little common salt, which makes a waterproof wash. The peculiar quality of this slop is made known by a curious accident. A laborer employed lime-washing in a private house accidentally upset a salt box; and in order to conceal the disaster, he swept the contents of the box into his pail. It was afterwards found out that the wash had set as hard as cement, and would bear being scrubbed. This led to experiments, among other tests being that of white-washing the walls of a well, the material being applied with a syringe where a brush would not serve; and in this case the salted whitewash was as good as even four years after application. Dr. Koller attributes this curious effect of adding salt to lime-wash to the absorption of water by the salt, thus enabling the lime to combine with the carbonic acid of the atmosphere and form a hard and durable coating.

For waterproofing buildings much exposed, a solution of melted paraffin in three parts of heavy red tar oil is recommended. This paint must be applied hot, which

may be conveniently managed by keeping the paint hot in a bucket of hot water. Water glass, for waterproofing walls, has fallen somewhat into discredit of late, which Dr. Koller ascribes to improper usage. The composition should be applied as follows, after the walling has had abundance of time for setting: Ten parts of sharp, dry sand, three parts of air-slaked lime, two parts of chalk or pulverized limestone, and soda water glass of 35 Balmé are the ingredients. The water glass is diluted with twice its weight of water; and the other materials are then mixed with it, until it has about the same consistency as mortar, in which state it is to be applied to the wall surface. In a day or two the coating becomes as hard as stone, after which one or two more coats may be laid on.

#### Color of Woods.

Almost all of the light-colored woods which are used for the interior finish of cars are liable to become darker by the action of light and varnish. Cars finished in the lightest ash show a very perceptible darkening in the course of eighteen months or two years. The general tendency is to grow yellow, whether the finish be of varnish or oil, dead or bright. The lighter the color of the wood, the longer the time before it reaches an unpleasant depth of color. Perfect wood, free from blemishes and light in color, is not easily faded. In some sections of the country the difficulty of getting it is so great that an inferior quality of wood is to be accepted.

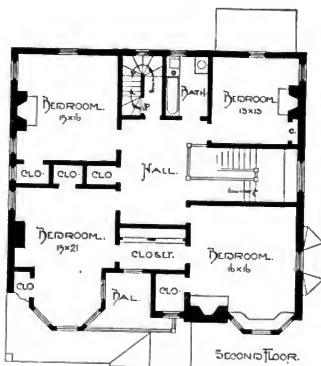
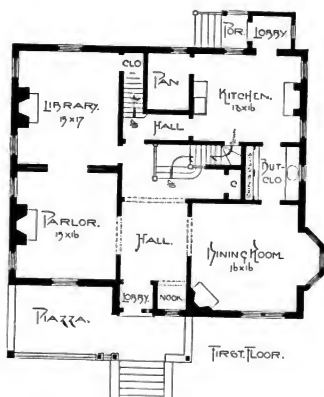
Roads which run through districts abounding in the ash are particularly fortunate, as they can get what may be called "water white" clear lumber, free from board wood, and at a price not paying a higher price for it than the ordinary grades. Several advantages are gained by the use of very fine whitewoods. The first is that the great resistance to darkening, which prolongs the life of the inside finish. Next in importance is the improved appearance of the car and the increase in the light at night. The difference between a dark and a light finish, as nearly as can be ascertained without actual photometric tests, is about 60 per cent. White and red maple when first finished are lighter in color than ash. The white maple has little or no grain, and the rock, wavy or bird's eye maple turns yellow very quickly. Both of them are in this respect somewhat inferior to ash. Maple contains a considerable proportion of tannic acid and is easily and quickly stained by the application of iron solutions. When stained properly, it appears to hold its color well. Although not very deep in color, it resists fairly well the darkening action of both varnish and light. Other woods are often stained to improve or change their color.

In place the change of color under the action of light is due to the resin.

When this is removed the wood remains white or very light in color. The resin and the yellow color, by action of moisture, is removed. Soda and potash solutions, followed by oxalic acid, discharge the color and leave the wood nearly white. Chloride of lime or bleaching powder can be used for bleaching. Potash in a concentrated form actually destroys wood fiber and produces great discoloration. A weak solution of oxalic acid, however, is a powerful bleach, and would be useful on many different kinds of wood. Chemically, there should be no difficulty in removing the coloring matter from the heart wood of ash now in bleaching any of the common hard woods used for finishing. After the color has been discharged from the wood, the greatest variety of effects may be produced by staining or dyeing. The yellow browns or reds of the woods prevent the use of a large amount of the dye which would otherwise be necessary for finishing. White wood, if bleached wood almost any transparent color could be used for a stain. There is a Japanese method of treating wood for backgrounds or ornamental work which is well worth attention. It consists in removing the softer portions of the fiber as well as to leave the remaining grain in high relief.—*Nat. Car Builder.*

#### Plans and Specifications.

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[See page 18.]

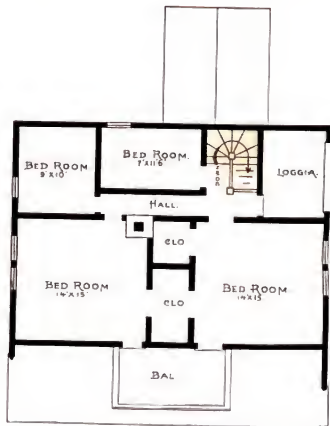
A RESIDENCE AT PORTLAND, ME.



A COTTAGE IN MAINE.- COST. \$900.



FIRST FLOOR.



SECOND FLOOR.



A Cottage at Short Hills, N.J.



FIRST FLOOR.



SECOND FLOOR.





[See page 18.]

A RESIDENCE AT PORTLAND, ME.





[See page 18.]

A RESIDENCE AT PORTLAND, ME.



## AN ARCHITECT'S HOME.

"Netherheys," Watford, the residence of W. Wallis Baldwin, architect. To design a house on a small scale which shall have the comfort and convenience of a large one is not an easy matter, or, if it be easy, it is not often done. In houses of little more than cottage dimensions there is generally a up or a pinch somewhere; entrance, parlors, bedroom, or kitchen usually succumb to some hardship of size, aspect, or shape. But in "Netherheys" there has been a very critical statement of details, in fact, so nice did it appear to me that I felt much inclined to the architect owner for his permission to publish the plan, which explains for the benefit of others how he has worked out the problem of making a small house thoroughly easy, comfortable, and complete.

In an area of less than an acre, surrounded on two sides by broad roads, in the suburbs of Watford, "Netherheys" has advantages of position, aspect, and surroundings which are not usually devoted to small houses. By the design of its exterior the cottage-like appearance is very marked, more especially on the entrance front. Passing through the carefully designed gateway, the drive opens into a square gravel court bordered by square-set yew hedges. It will be seen from the plan that the outbuilding to the left flanks and protects the entrance acreage, and between this and the stair turret is a paved landing. The porch is nicely finished with marble steps, mosaic floor, high dado of oak framing with scene panels, and leather paper wall filling and ceiling. A good feature, and one we seldom meet with, is the circular stair turret. The stairs are shut off from the porch by a doorway, and from the hall by a curtained archway. This semicircular arch repeats at the other end of the hall, and within it are arranged in a V-shape the doors to the drawing room and own room (see sketch). This little hall is a great feature of comfort in the house with its little corner fireplace (hooded over with marble jambs) and long five-light window with fixed seat under. Generally speaking the good points of the plan will be obvious to many of my readers. The dining room is conveniently served from the kitchen, as much out of sight and sound as is possible in a small house, and far more so than one usually finds in large houses. The fireplace recess is just deep enough to provide comfortable fixed seats at either side of the mantel jambs, and gives a very convenient bench to the room. The garden porch forms a useful connection between the dining and drawing rooms. The drawing room is a pretty apartment, with a sort of orange-colored paper, specially printed for the architect. The third room is fitted as a sort of library and business room, with an arched fireplace recess. The bedrooms, bathroom, and upper corridor landing are all nicely treated. A long terrace and Dutch flower garden are good items in the surroundings which my sketches indicate. (See pages 26 and 28.)

At the proof of a publishing is in the cutting, so we may say of a house that a jewel of its comfort is found by living in it, and we can safely affirm that in all our writings we have never realized more fully the benefits of a well designed modern English home than at "Netherheys."—T. Raffles Darleyn, *The Brit. Arch.*

If any of our readers have made an invention for which they have thought of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful business in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.

## The Planning and Construction of American Frame Houses.

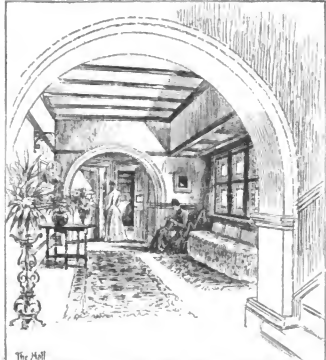
Mr. C. H. Brodie recently read before the Architectural Association a paper on this subject, illustrated by some sketches, details, and tracings by the author, and also by numerous plans and perspectives from the United States professional journals, says *Building News*. Mr. Brodie mentioned that he was engaged on business in America during the winter of 1887 and the spring of 1888, during which period he spent considerable time in New York and Chicago, with flying visits to Boston, Baltimore, Philadelphia, Washington, Pittsburg, St. Louis, Kansas City, Milwaukee, St. Paul, and Minneapolis, and other cities. Such houses as were illus-

trated were floated down the great rivers to convenient points for transport by rail or boat. A frame house may be very expeditiously erected. The drawings on the walls show a basement, arising only one foot or so out of the ground, built of either brick or reinforced stone, and on this is a frame of quarter-part houses, two stories high, forming inclosures and divisions. These and the joints being fixed in position, the roof can be immediately constructed and covered in, so that while the outside is being completed, the inside too, is progressing, and during the time that the house is getting up a scaffold, the frame house is built. The plasterwork being then, if necessary, dried by artificial heat, the joinery and other fittings are placed, and the dwelling is ready for occupation in a very short time. Should the worthy owner's family increase, additions to the house are just as easily and expeditiously made. The plans show a basement and two upper stories, and the roofs being mostly of steep pitch, plenty of room for attics is obtained in them. The basement contains a laundry, beer and wine cellars, coal cellars for both house and furnace coal, larders, and the heating chamber, containing either a boiler for steam or a furnace for hot-air heating. The hot water generated is distributed by ducts quite evenly over the whole house, and most of the rooms have no fireplaces. This is a stage of civilization to which we have not yet generally attained. Where fireplaces do occur—and this is chiefly on the ground floor—an ash pit is provided under each, into which, when the hearth is swept up, the ashes, etc., are dropped by moving a damper or hatch. These ash pits are marked on the basement plans. The ducts serve in the hot weather to distribute cold air over the house, the air in the cellar, whence they start, being naturally cooler than that outside, while, if cold, if necessary, be cooled still further by artificial means.

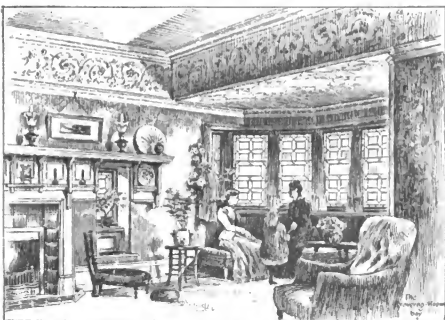
Coming to the ground floor or first story, as their plans have it, we find a parlor and dining room, and also perhaps a library or a second parlor. The dining room is always in connection with the kitchen, through a lobby or pantry. You will note, also, that there is no scullery shown, although on some of the plans is a diminutive space marked "sink room." On this floor are also various store rooms and closets, water-closets, lavatory, etc., depending as to size, number and variety on the general dimensions of the house. And here I would call special attention to the very complete way in which all classes of American houses are fitted with cupboards, shelves, drawers, sideboards, bookcases, etc., all conducting in so eminent a degree to the comfort and ease of the occupants. No bedroom that I occupied in any private house in the States was without a cupboard large enough to walk into and turn round in. The convenience of this is too obvious to need expression. The hall is always furnished, and used as a room; most of the American plans have it designated "reception hall," and seldom even "sitting room." The veranda is also a most important feature, and one

never omitted. During the hot season it is enclosed with blinds, and becomes the most frequented part of the house. The first floor has the bedrooms and bath rooms, linen closet, etc. You will observe that in most cases the water closet apparatus is kept away from, and not, as with us, next to the outside walls. This is to avoid fracture by freezing during the intensely cold weather. To return to our subject, the plan of the house shows that all the chief bedrooms have a fixed lavatory fitted, generally, in a cupboard, so as to be out of sight. This adds, of course, very considerably to the plumber's bill, but in the long run it is a great saving, for labor of all kinds is terribly scarce. Bathrooms are freely provided on this floor, and are the delightful spots in the hot weather, while they always form a feature in the elevations. The attic are used for servants

(Continued on page 28.)



The Hall



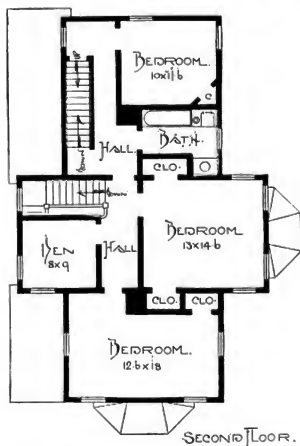
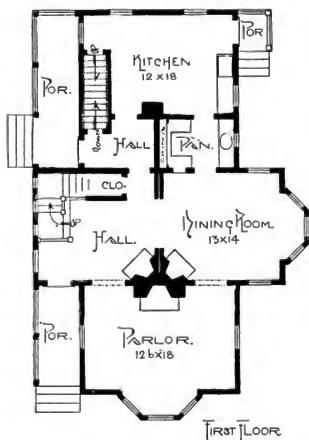
AN ARCHITECT'S HOME.

trated on the walls are, he remarked, the type of American houses, alike in the North, South, East, and West. In the actual town area, the erection of timber houses is now forbidden. Still, in the Southern States universally, and over the country and suburban districts generally, it is rarely that any but timber houses are erected. The average time for erecting a frame house is sixty days, but many have been built in sixty, and while the life of the structure may be averaged fifty years, there are very many in existence even one hundred and some two hundred years old and over.

Again, stone quarries as yet worked are few and far between, and brick works are not by any means numerous. But the country abounds with the most beautiful timber, with which even the denuded Eastern States are kept plentifully supplied by means of im-

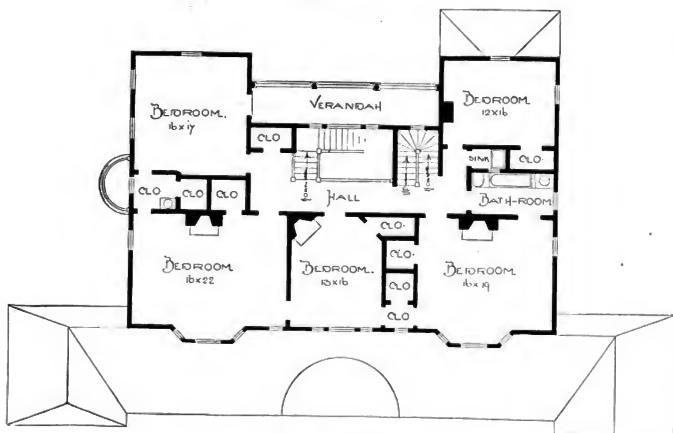
ported lumber. During the hot season it is enclosed with blinds, and becomes the most frequented part of the house. The first floor has the bedrooms and bath rooms, linen closet, etc. You will observe that in most cases the water closet apparatus is kept away from, and not, as with us, next to the outside walls. This is to avoid fracture by freezing during the intensely cold weather. To return to our subject, the plan of the house shows that all the chief bedrooms have a fixed lavatory fitted, generally, in a cupboard, so as to be out of sight. This adds, of course, very considerably to the plumber's bill, but in the long run it is a great saving, for labor of all kinds is terribly scarce. Bathrooms are freely provided on this floor, and are the delightful spots in the hot weather, while they always form a feature in the elevations. The attic are used for servants

(Continued on page 28.)



[See page 18.]

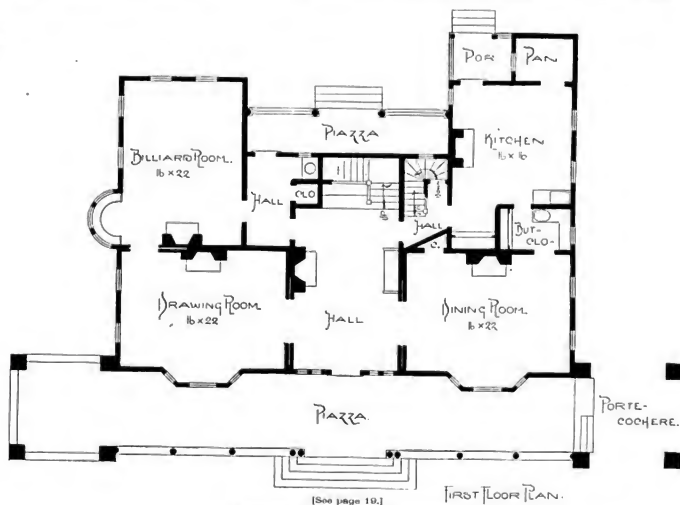
A RESIDENCE AT AUGUSTA, ME.



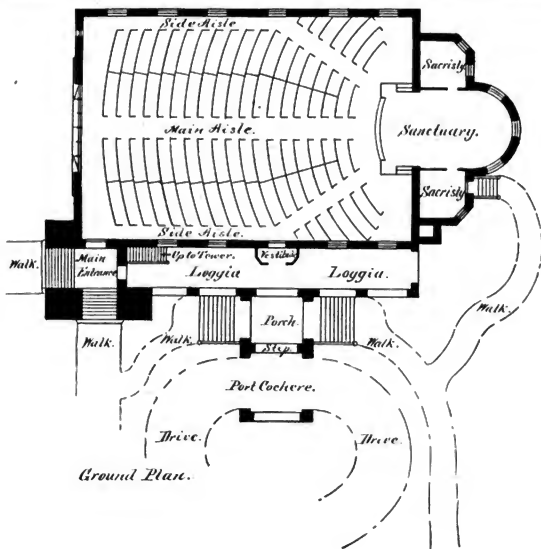
SECOND FLOOR PLAN.

[See page 19.]

A RESIDENCE AT BELL HAVEN PARK.

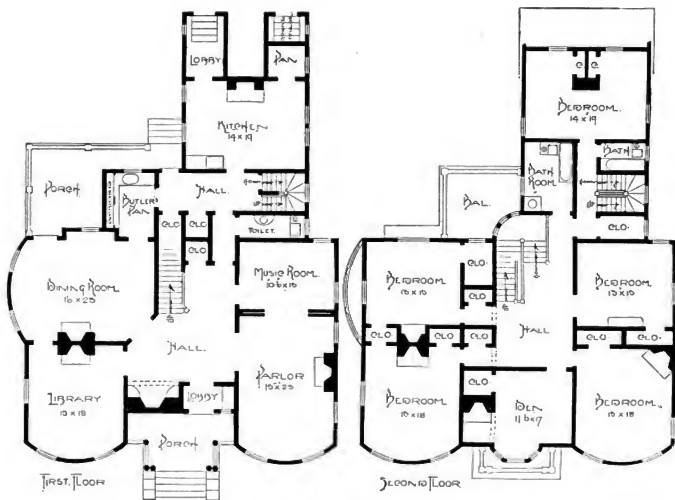


A RESIDENCE AT BELL HAVEN PARK.



A SUBURBAN CHAPEL.

ST. PAUL ARCHITECTURAL SKETCH CLUB COMPETITION—SUBMITTED BY O. M. HOKANSON.—From the Northwestern Architect.



[See page 19.]

A COLONIAL RESIDENCE.





The Planning and Construction of American Frame Houses.

(Continued from page 25.)

rooms—each still with a good cupboard—box rooms, store rooms, etc., or the space is frequently just floored and then left to be cut up as the wants of the occupants may later on suggest. About the elevations, outside and in, or the artistic part, one need say nothing, except that, to our eyes, the calm and dignified treatment of the English example contrasts very favorably with the fineness and over-pictorialness and evident striving after "features" which spoils so many of the other designs. The construction you can study at your leisure by referring to a specification printed in black, which is in the Institute Library. It is indexed under the name of the publishers, Messrs. Palliser, of New York, to whom I am indebted for a good deal of the information this paper contains, and for a drawing and specification hung on the wall. I was struck with the very practical character of the specification. For instance, among the general clauses I read: "The carpenter will make all patterns, etc., and will provide suitable protections to all openings to keep out the cold, rain, etc., and will clear the building of all carpenter's waste materials before the plastering is commenced.



The Terrace Front

The mason must provide coal and stove in cold weather for heating the building while his work is going forward and until it is dry."

Continuing, we shall get particulars how this class of house is put together, and we naturally find after the general clauses the necessary directions as to the excavations. The only unusual point here is: "The bank is to be dug well away from the walls, and left open until the walls are set and dry." The damp course is to be either slate and cement or asphalt. The brick walls are required to be built to "a true line from one end to the other, even to the cutting of a brick where necessary, so that a carpenter can size the joints to an exact width, and place them directly upon the wall without blocking up with chip or pieces of wood." The facing of these brick walls is to be "neatly tuckered and properly cleaned down with aquafortis, and oiled with raw linseed oil at completion," care being taken not to injure, in cleaning down with acid, any cut stone work.

The laths for lathing are to be "laid a full one-fourth inch apart, and joints broken every eighteen inches." Wood laths, however, are now rarely used, I never saw any at all. The plastering is put on wire netting, or one of the many forms of pierced or ex-

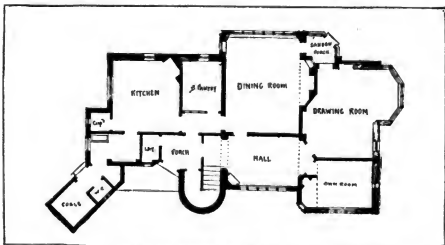
panded metal now coming into use in this country. The plastering is to consist of "a good coat of brown, well-haired mortar, made of pure unslaked lime and clean, sharp bank sand, free from loam and salt, and best cattle or goat hair, well mixed by continued working, and stacked in the rough for at least—weeks before putting on." The finish is to be "a coat of best soap-stone finish, manufactured by the company, composed of finishing line putty (two parts) and patent soap-stone finishing (three parts), thoroughly mixed two days before using, and applied in the most careful manner, as per directions"—I suppose of the manufacturers. The color of the trades as they are placed in the specification differs considerably from our usual arrangement; and we next come to the carpenter and joiner. All the timber which will be exposed at the finish is required to be of a certain quality pine. The joints are to be placed, in all cases, with the "crowning" edge upward, and those over so many feet in length are to be "worked crowding" so many inches before being placed in the building. Describing the partitions—a most important item of a framed house—the specification directs that "all door and window studs are to be set double, and all openings over three



The Entrance Front

feet wide trussed overhead. All angles must be formed solid by blocking and spiking two studs together. No studs are to stand on the floor, nor on the joists, if there are partitions under, but all are to foot on top of the partition plate below."

The outside of the external partitions, and also the roof, is covered with seven-eighths inch matched boarding, called "sheathing," which has to be "nailed at each edge at every bearing with 10d. nails." Nails are throughout the specifications described as so many "penny" ones—a nomenclature common also in Ireland. The whole exterior is then covered with waterproof felt, the joints lapping two inches, and it is tarred under all architraves, friezes, cornices, brackets, etc., "so as to make a perfectly tight job." Outside this felt comes the finish which is actually seen, which on the partitions is weatherboarding, or, as it is called in the States, "clapboarding." This is to be of "clear, beveled white pine, five inches in width by one-half inch thick at the butt, and three-sixteenths inch at the thin edge, laid with not less than a lap of one and one-fourth inch, and nailed with 8d. box nails every sixteen inches. The nails are to be set in." The veranda floor is to be constructed with one and one-fourth inch by three and one-half inch white pine boards, laid with "paint joints." The roof is generally covered with



shingles, and so also are the gables and other features. The shingles are usually of cypress, which grows abundantly in the swamps of New Jersey and the more Southern States. The logs are floated down the river to the various mills, where the shingles are cut in enormous numbers. One mill cuts 300,000 daily. They are eighteen inches by six inches and are on bottoms, with on roofs five and one-half inches to the weather, and on vertical parts six inches, each nailed with two nails, and kept three inches from angle of valleys. Sometimes the roofs are of slate, and frequently they are flat, in which case they are mostly covered with tin, although asphaltum or gravel composition is sometimes used. In either case the roof is boarded on the joists with seven-eighths inch boarding.

Coming to the floors, pugging—or, as it is called, "denfening"—is used in all the best rooms, and these have also a double floor—a rough deal one and a hard wood finished one, with between them a layer of "all wool Pyramid brand, resin sized, denfening felt," fastened down by two inches to one-half inch strips, to which the hard wood floor is secret-nailed. The rough floor is described to be fitted down carefully around all studs, etc., up to the sheathing, so as to prevent mice circulating. Here is a good clause: "All the plastering is to be finished, cellar cemented, and all mason work done and thoroughly dried through before any of the interior joinery is brought into the building or put in position." The materials used for doors are required to be thoroughly seasoned and kiln-dried, and on the plans the sizes for both width and height are figured. Sliding doors are much used, while many openings have no doors at all. These would be provided with curtains, which

give the desired privacy. There is no question of "draughts" in an American house, which is warmed equally throughout. All the doors have a hard wood slip three-fourths inch thick, splayed each edge, fixed under them. This enables the door to open clear of carpets, etc. The windows are mostly double hung

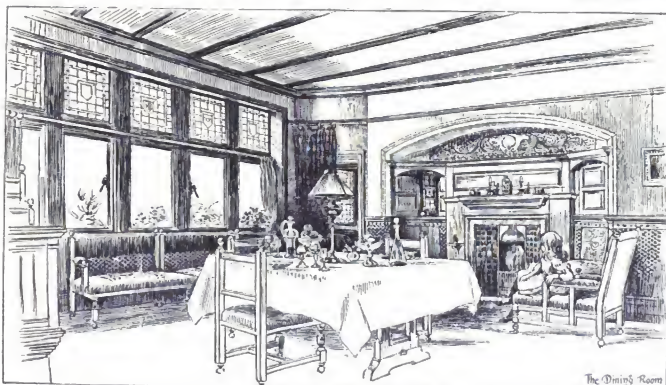
sashes, requiring no special description. All are directed to have a burglar-proof fastening. After a description of the stairs most minute directions follow for the fittings of the various pantries and closets upstairs and down. These include clothes closets, linen and china closets, and butler's and kitchen pantries, as well as the various store rooms. Then we get a full description of the refrigerator and ice safe, which consists of two thicknesses of boarding, two inches apart, filled with mineral wool, then an air space of one inch, and a layer of resin-sized waterproof paper, the actual inside being of clean, narrow matched spruce. The lower part is the ice safe or tank, and it is lined with sheet zinc, and the bottom covered with a wood grating to prevent the ice cutting the metal. The doors of these spaces are constructed in precisely the same way, and the joints between door and frame are double rabbeted.

The wood finish is described to be first a certain patent "mineral filling," and then another "patent transparent wood finish." The hard wood floors are to be done in the same way, but with a "vegetable" filler. The tinwork is to be painted two coats of metallic paint, and here I may say that this tin-er, to speak more correctly, tinned iron—is used wherever we use lead, and also for the rain water pipes and gutters. Lead is too expensive, and it is also more affected by changes of temperature.

**PAPER FROM CORN HUSKS.**—Corn husks teilled in caustic soda are being utilized for the manufacture of paper. The cooking process results in the formation of a spongy, glutinous paste, which is subjected to heavy pressure so as to eliminate the gluten, the fiber remaining being made into paper in the ordinary way.



The Entrance



The Dining Room

## THE WASHINGTON STREET TUNNEL, CHICAGO.

It is impossible to estimate how many people daily cross the branches of the Chicago River, which separate the business portions of the city from the great north and west sides and divide the city into three distinct sections, each having its particular characteristics. It is sufficient to state that the various bridges long ago proved inadequate, and tunnels were built under the river to accommodate the currents of traffic continually passing to and from the north and west divisions. It is stated that 22,000 vessels pass through the Chicago River in the seven months comprising the season of navigation, and the constant swiveling of the masonry is a hindrance and delay that even the tunnels cannot adequately relieve. The Washington Street tunnel, through which the West Chicago Street Railway Company has the right of way, well illustrates tunnel construction. This tunnel is a little more than 1,735 feet long, and was built in 1890, at a cost of nearly \$400,000. The bed of the river and the top of the masonry of the river portion are the same, and as it allowed a depth of but 14 feet at low water in the river, the top of the masonry was continually being damaged by vessels, and proved an obstruction to the free navigation of the river at low water.

A few years ago the West Chicago Street Railway Company got permission from the City Council to operate its cars through the tunnel, on condition that the level under the river should be lowered so as to have at least 17 feet of water over it at the low stage, or 19 feet at mean water, and also that they build a masonry center and end piers over the tunnel to accommodate a swing bridge, the city supplying the superstructure. Mr. R. G. Artigian, the well known Chicago engineer, was intrusted with the work, and it was completed in the spring of 1890. For the river section one-half of the stream was founded by a cofferdam, the timber crib which was to serve as the foundation for the masonry center pier being used as the head of the cofferdam; when this was pumped dry of water the arch of the old tunnel was taken up and a cover for the tunnel built with steel girders 30 inches deep and 24 feet centers, with brick arches between the girders in four rings of brick, covered with a layer of asphalt and then with 12 inches in thickness of cement concrete. For the portion under the crib for the center pier, and also under the dock walls or end piers, a three-centered arch, built with five rings of bricks, was adopted. The part under the center pier was built by the usual methods of tunneling under the cofferdam. This part has not only to serve the purpose of a roof over the tunnel, but also to now supporting the masonry center pier and swing bridge. The approaches and all parts of the tunnel since the time were put in thorough repair, the grade of roadway under the river lowered to correspond with the lowering of the roof, and the grade of approach changed.

The West Division Street Railroad Company are now building under the Chicago River, about one-quarter mile south of Washington Street, a tunnel for the exclusive use of their street cars. This work is being done under the direction of Mr. Artigian, who is now chief engineer of the sanitary district of Chicago, and it is expected will be finished in the fall of 1892. The dimensions of the tunnel are very large, as the company are sparing no expense to make it light, airy, and pleasant for their passengers. The tunnel is 30 feet clear width inside by 16 feet high, and besides passing under the river, goes under two seven-story buildings and our five-story building, and also under all the railroad tracks entering the Union Depot. A large portion of this tunnel is built, and the part under the tracks is in process of construction; the tracks have been undermined and supported without interfering with the passage of a single train. The cost of this tunnel will be about \$3,225,000.—*The Graphic*.

## Church spires.

The origin of the spire, like that of the pointed arch, is merely matter of conjecture. The probability is that it arose out of the peaked roof usually given to campaniles and towers of a preceding period, which form was afterward gradually improved upon and refined, till it eventually grew up into the slender tapering spire. According to such supposition, we would refer to the tower of Thion Church, in Normandy, as an example exhibiting the rudiments of the spire, it being no more than a steep peaked roof or low pyramid, whose height does not exceed three-fourths of its base. A peak of this kind differs also from the spire, both in being the same in plan as the tower on which it is placed and in being immediately set upon it, whereas the spire is almost invariably an octagon or other polygon, and is surrounded at its base with a parapet. In Italy, where campaniles are usually detached square towers of very slender or lofty proportions, the spire is almost unknown, for such towers have seldom more than a mere pyramidal roof of peak, which, though it may be considered as the germ from which the Gothic spire was afterward developed, is in itself of quite different character; yet, at the same time, that of such is best adapted to the respective style. There are some few instances of square spires,

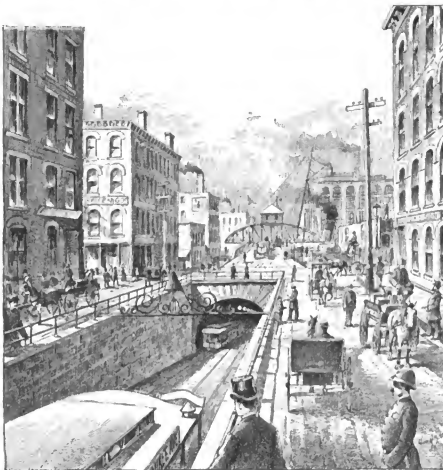
proprietor of the building, after the work is completed. The reply, which is certainly definite enough, is as follows: "The architect is obliged to deliver, to the proprietor, who has employed him, the plans of the constructions which have been carried out under his direction, as soon as the work is completed, on the condition, however, that the architect's fees have been fully paid." This view of the law is supported by several decisions in France.—*Amer. Architect*.

## Simplicity in Furnishing and Decorating.

If people could only be guided into simple habits and ideas as regards so-called comforts and ornaments, we should not only be more likely to develop nobler art, but also to secure less toil and trouble in the carrying out of the useless gildwork which with the homes of all, from noble dukes to well-to-do tradespeople, at present abound. As a rule, it may be safely admitted that rooms are too much furnished and that the doors, windows, dressings, and walls are overdone with too little competent care bestowed upon them. Were the constructive features of a room properly looked after, much furniture and upholstery would be as needless as it is troublesome to keep in order and free from falling evil, and would be a source of trouble arising not altogether from without.

Dwellers in town are particularly subject to this all-gravelling evil, and it is arising not altogether from without.

Houses are more or less vibratory, especially where there is heavy street or train traffic in the vicinity, and we have not yet cleared out our stock of smoky fumes. So that in addition to paying particular attention to the fitting of doors and windows, we would urge the selection of only such furniture as may be easily moved about, or so raised above the ground as to leave at least 8 inches clear space underneath. Avoid useless side tables and cabinets, which are so often dragged in for no other purpose in the world but to carry "art emporium" rubbish. Remember that all furniture beyond what is really necessary for comfort and convenience only provides so many more traps wherewith to catch the dust. Avoid all wooden floors, stuff in such upholstery as it may be deemed necessary to have. These two or three simple hints can be acted upon by nearly everybody. To those whose means admit it, we would suggest the use of this parquet over old floors; upon such a floor only one or two rugs, in lieu of the usual carpet, would be needed, which should be of a close, hard texture. These are words substituted the grand and



THE WASHINGTON STREET TUNNEL CHICAGO.

among them a very singular one at Egen, in Germany, where two such spires are set immediately together upon the same tower. But however slender in their proportions such spires may otherwise be, they have a certain heavy massiveness of form. When, therefore, greater loftiness and lightness were aimed at in this feature, the adoption of a polygonal plan for it became almost matter of course; for although, in a geometrical drawing, the general outline and proportions of a spire are the same, whether it be square or octagonal in plan, the perspective or actual appearance is widely different; because, in the latter case, the diagonal breadth of the square tower below is cut off, and each side or plane of which the spire is composed becomes a much more pointed triangle. Beside which, the polygonal spire produces a degree of contrast and variety highly favorable to general effect in the pointed style.

## Ownership of Plans.

The question of the ownership of plans, under French law, is brought up, and very clearly answered, in *La Semaine des Constructeurs* for Oct. 3, 1891. A correspondent asks the "Committee on Jurisprudence" of that journal, which is composed, of persons thoroughly acquainted with the subject, whether an architect is bound to deliver the plans of a building to the

semi-grand piano for the dust-attracting cottage instrument where possible, and abolish forever the hideous practice of covering our furniture with all kinds of drapery and frippery.

## PATENTS.

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## UTILITY AND ART.

That theory which would base architectural beauty upon utility and fitness is so far from being satisfactory as clearly tracing the source of the former quality to the latter, that, instead of removing perplexity, it rather increases it. In direct opposition to such doctrine, everyday experience convinces us that, so very far from constituting æsthetic beauty, more utility and fitness contribute very little at all toward it, even in architecture, where, as far as the purpose of building is concerned, they might seem to be not only indispensable but all sufficient, and afford all the pleasure which the mind can derive from examining and contemplating edifices of any kind. Yet such is assuredly not the case; on the contrary, it is only when it aims at something more than utility, when it indulges in the superfluous or the useless, in short, when it steps into the province of art and aims at the idle gratification of the eye, that architecture is entitled to the high distinction claimed for it and the lofty pretensions set up in its behalf. Upon the utility principle of beauty a turnip field would be a far more agreeable prospect than any to be met with in Swiss or Italian scenery; and upon the common sense fitness and utility principle, a church erected according to the liturgies of Bethnal Green taste ought to delight quite as much as, if not more than, any of those glorious examples of our ancient ecclesiastical architecture which so wonderfully impress the mind. Unless the word "utility" be exceedingly elastic indeed, and its meaning so ductile that it may be drawn out like gold to the most prodigious extent, utility cannot at all be said to recommend the dome of St. Paul's, it adding nothing whatever to the serviceableness of the building; while on the other hand, the mighty platforms or galleries with which churches used to be encumbered ought to be accounted beautiful, since they certainly had the plea of being useful as far as affording sittings goes.

## AN IMPROVED DOOR HANGER.

We illustrate herewith a new sliding door hanger, manufactured by the Mungier-Colton Mfg. Co., of Chicago. The principal objects aimed at by the manufacturers, with this hanger, are to reduce to a minimum the space between the sliding, thus securing more space in the room, and also to bring the soffits much closer together than has been heretofore possible, thereby doing away with a wide unsightly opening overhead. By the peculiar construction of the "Colton" hangers, these objects have been attained, a space of one-fourth inch only being required between the soffits.

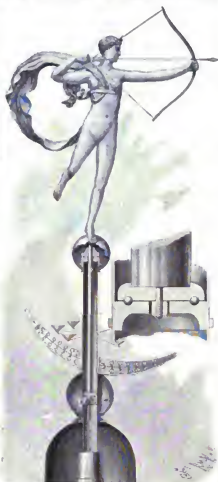
One figure represents a side view of the hangers with parts of the door and track broken away, also with one wheel taken from the back hanger, to show the construction. The working parts are made of steel and the hangers are so constructed as to adapt the wheels to unequal elevations of track, or to allow the wheels to pass over obstructions upon the tracks. The wheels are upon independent axles, and it is stated that a variation of nearly two inches in the height of the tracks will not interfere with the perfect working of the hangers, as there is no side motion. The parts being of steel, the space between the straddling is reduced to a minimum, and the space between the soffits can be reduced to one-fourth inch. The other figure shows an end view of the hanger upon the track, the dotted lines representing the possibilities of variation of the hangers, to conform to a similar variation in the elevation of the tracks. A sheet of directions, being an architect's drawing in detail, showing every part full size, is packed with each set, and will be mailed to any one upon application. Another novel and useful feature is the packing of the necessary screws in separate en-

velopes, duly labeled for each part, thus saving time to the mechanic and builder, and securing the use of screws of proper size.

Messrs. H. H. & C. L. Mungier, 143 Lake Street, Chicago, are the general agents for this hanger.

## THE MADISON SQUARE GARDEN WEATHER VANE, THE HUSTLER DIANA.

The tower of the new Madison Square Garden, of this city, has recently been completed, and has been



surmounted by the great weather vane representing the huntress Diana discharging an arrow in the direction whence the wind is coming. On account of its elevated position and high artistic character the colossal statue, for such the weather vane really is, has attracted much attention. The general design is due to Mr. Stanford White, of this city, who was the architect of the building and the tower, and who is the architect of the Washington arch in this city, now approaching completion. The statue proper is the production of the celebrated sculptor, Augustus St. Gaudens. The full sized model was supplied from the artist's studio, and the statue was reproduced in metal by W. H. Mullins, of Salem, Ohio.

The statue, whose general appearance is given very accurately in the cut, is 18 feet in height, and, with its iron frame, armatures, and counterbalancing, weighs 1,500 pounds. It is made of 22-ounce copper, struck up in drop process. The process of manufacture was as follows: Using the statue as a model, a number of plaster of Paris moulds were made to cover, section by section, the entire figure. From each of these moulds a casting was taken, the cavity being filled with melted zinc, thus giving an accurate male die, reproducing every detail and roughness of the original statue. Female dies were made, also of zinc, using the

male dies as a base. The statue was struck up from these dies. A corresponding pair were placed in a drop press and accurately adjusted. Sheet copper, cut to proper size and placed between the dies, was gradually struck up by a succession of blows, with constant annealing between the impacts. In general, the female dies were continually replaced by others of increased depth, a single male die in general answering for each part. A shallow rebate was worked upon some of the edges of the pieces, so as to enable a comparatively flush joint to be made by lapping an unrelated edge thereon. The whole was then riveted together and finally brazed, so as to produce a water-tight structure.

The frame consists principally of wrought iron pipe. A 7 inch pipe runs up through the central axis of the figure to the head, and to it other pipes, bars and stays of iron are secured, running to and attached to different parts of the figure as required.

The foot of the figure rests upon a hollow ball, 22 inches in diameter; an extension of the central 7 inch pipe runs down a further distance of 9 feet; and this is surrounded by a 10 inch pipe, which extends up a short distance through the bottom of the upper ball. The lower ball is 3 feet 4 inches in diameter.

It is obvious that as the statue turns, the 9 foot section of pipe must also turn, and that the upper ball attached to the figure turns with it. The construction, it will be seen, absolutely excludes all rain from the interior of the 10 inch pipe. The weight of the figure is sustained by two horizontal ball bearings, about 9 feet apart and within the 10 inch pipe and lower ball. Each bearing consists of two annular grooved flanges, between which a number of 1½ inch steel balls work within the grooves. By adjustment of the relative parts, principally as regards the location of the frame, the center of gravity is brought as nearly as possible to fall upon the axis of the 7 inch pipe. A bolt and nut at the bottom of the rotating pipe holds the figure down to its position, so that it cannot leave the ball bearings. A wind pressure of one-fourth of a pound to the square foot is sufficient to move the statue.

Below the figure is the great crescent, measuring about 13 feet from tip to tip and 22 inches in horizontal depth. This is built upon an angle iron frame. The sides and bottom are closed with plate glass in small panes, and a series of lead coils the top. Within the crescent are 60 incandescent lamps, ten of 30 candle power and the rest of 10 candle power each. Immediately above the crescent, ten reflecting lamps are arranged to cast their rays upward upon the figure. The apex of the figure is 84½ feet from the ground. The highest point accessible by fixed ladders is the crescent, 32½ feet from the ground.

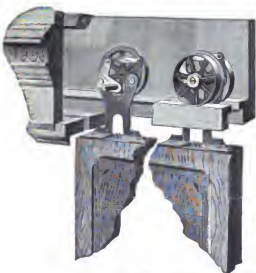
A lightning rod connection with the rotating figure is thus arranged: The upper part of the 10 inch stationary tube is surrounded with a copper ring immediately under the upper ball. From this ring six arms of copper rod extend upward, terminating in points almost in contact with the ball, which latter, it will be remembered, turns with the figure. From the ring the main lightning conductor is carried down to the ground.

## SCHMIDT'S WINDOW FRAME.

This window frame, the illustration of which appeared in our December number, has a diagonally placed parting rail in the sash sliders, by which the sashes, when closed, are firmly wedged in position to exclude air and prevent rattling, while an upper and a lower spring in the parting rail holds either sash at any special point where it may be left. It is a patented improvement of Mr. August Schmidt, of No. 1708 Amsterdam Avenue, New York City.



SCHMIDT'S WINDOW FRAME.



THE COLTON SLIDING DOOR HANGER.



END VIEW.



## Sackett's Wall and Ceiling Board.

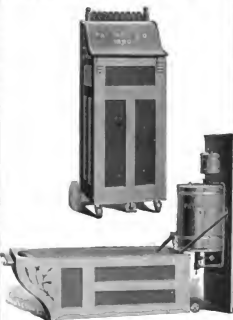
A new building material has just been placed on the market by the Sackett Wall Board Company, 38 Day Street, New York. This is a fire proof board for walls and ceilings. This board is nailed directly to the studs, and does away with lath and plaster. It will not warp or crack and can be applied by unskilled labor at any time of the year. Rooms finished with it can be occupied at once. As there is no moisture in the material, wood trim may be finished to it at once, without danger of being injured by twisting or swelling. This material is cheaper than lath or plaster. For ceilings of churches, theaters, large dining rooms, halls, and stores it is said to be superior to wood, as it is fire proof, and to plaster, as it will not crack or fall, and admits of any class of decoration. Specimen work may be seen and samples and estimates obtained at the office of the company.

## AN IMPROVED MITERING MACHINE.

The accompanying illustrations show back and front views of the new No. 3 Universal miter machine made by the Fox Machine Co., of Grand Rapids, Mich. It has all the latest improvements, adjustable stop, universal column, universal squaring gauges, adjustable miter gauge, adjustable bed plates, etc. The carriage is in form of a triangle strongly braced, and, being firmly guided in the upright frame, the knife must make a straight and true cut. The bed plates are placed adjustably in the bed of the machine, and can be elevated at the end next to the knife. This is done to make a slight undercut on the moulding, which always insures a tight joint on top. The miter gauge is made adjustable to and from the knife, a necessary requirement in cutting hard wood or wide mouldings, and is provided with a stop to cut mouldings the exact length. A squaring gauge attachment consists of a central post secured to the bed by dowel pins and thumb screws. At each side of the post is pivoted a gauge, secured the same as the gauge on B trimmers. This gauge can be set at any angle, and always makes a shear cut with the knife. The post can be quickly removed and the miter gauge placed in position to cut miters. Motion on the Nos. 3 and 5 machine is obtained by a foot treadle connected by a rod to the carriage. A tempered steel spring raises the carriage to the top of the stroke. On the Nos. 3 and 5 the motion is obtained by a loose pulley and double rack, the same as the trimmer. The treadle rod on the foot power machines is threaded and has adjustable cushioned stops, so that in cutting

## A COMBINATION FOLDING BATH TUB.

The illustrations represent, in open and closed position, a bathing cabinet, which can be placed in any furnished bed room or other apartment, without detracting from the appearance of the room, while af-



A COMBINATION FOLDING BATH TUB.

fording the convenience and luxury of a bath room. The two side hinges that connect the top of tub to the back of heater, in connection with the two rollers on bottom, allow an easy and partially automatic movement. The waste water exhaust is so constructed as to connect and disconnect itself in folding and unfolding the tub. The heater resting on the brackets is made of galvanized iron and has capacity for warming twenty gallons, is arranged so as to let cold water circulate through the same supply to the tub and can be warmed to any temperature desired, using gas, gasoline or oil, and requires but a few minutes to warm

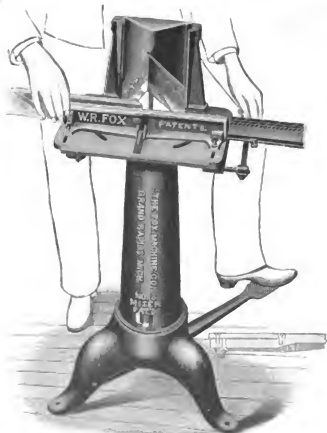
## Japanese Interiors.

The homes that the Japanese women occupy are, it goes without saying, says *Harper's Magazine*, as neat and wondrously fashioned as themselves; almost always full of surprises, with movable panels, with boxes and slides, with compartments of all shapes, and astonishing little closets.

Everything is scrupulously clean, even among the humblest, and of apparent simplicity, especially among the richest. Alone the altar of ancestors, where sticks of incense burn, is gilded, lacquered and garnished like a pagoda, with vases and lanterns. Everywhere else a purposed bareness—a bareness all the more complete and white if the dwelling pretends to elegance. No embroidered tapestries; sometimes transparent portieres made of string beads and bamboo. And never furniture; it is on the floor or on little lacquer pedestals that necessary objects or vases of flowers are placed. To the mistress of the house luxury consists of the very excess of that cleanliness of which I spoke above, and which is one of the incontestable qualities of the Japanese people. It is every where the custom to unshoe before entering a house, and nothing equals the whiteness of those mats upon which one never walks without fine socks with divided toes. The wood-work itself is white, neither painted or varnished, keeping as its sole ornamentation, among women of true taste, the imperceptible vein of the young pine.

THE fire which destroyed one-half of the immense State Asylum for insane, at Pontiac, Mich., recently, was chiefly remarkable for the fact that, although the flames spread with astonishing rapidity, not one of the several hundred demented female patients who occupied that particular wing of the building sustained the slightest injury. The building had been recently equipped throughout with some very ingeniously devised fire escapes, put up by E. T. Barnum, manufacturer of art wire and iron work, Detroit, Mich., and were covered with wire guards, preventing the patients from throwing themselves over. The same firm has recently been awarded the contract for four steel jail cells, at Kalamazoo, Mich. They are made of the best flat steel bars, in lattice shape, and are combined with all the elaborate locks and safeguards known to modern jail science. These steel cells put in an ordinary building constitute as perfect a jail as could be found in the largest prisons.

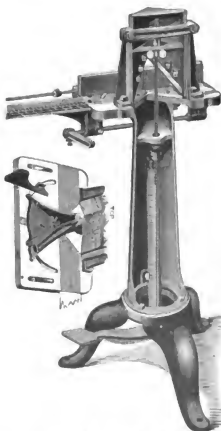
THE importation of cotton bale ties has now ceased, the article is now wholly made in this country, and the



FOX PATENT UNIVERSAL MITER MACHINE.

narrow moulding the carriage can be checked at any point in the upward stroke, making much less motion for the foot. In this machine, the column being made on a swivel, it can be placed to accommodate the workman, no matter in what position he stands.

the water sufficiently for a bath. A sanitary chair bath and a family portable chair bath of admirable design and construction are also afforded by the same manufacturers, the Combination Folding Bath Tub Co., of Marshall, Mich.



MITER MACHINE—BACK VIEW.

prices are lower than ever before known. The cause of the depression in prices is due to overproduction. For the year ending June 30, 1890, the importations of cotton tie amount to nearly 45,000,000 pounds, or enough to bind 4,500,000 bales of cotton.



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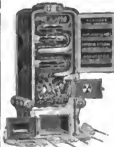
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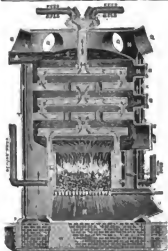
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(Continued from page 14.)

(9) A. U. asks: Will you be kind enough  
to inform me how to prepare barrels in order to keep  
spirits put in them perfectly white? I have a very fine  
kind of water 10 ft. deep, 8 ft. square; the sand running  
in it with the stream of water gives me a great deal of  
trouble. Could you advise me how to overcome it? I  
The method of preparing barrels for pure spirits, as  
practiced by our residents, is to clean the barrels by  
placing them hung down over a small steam pipe  
projecting into the barrel. Continue this for an hour or  
more, according to the condition of the barrel. Then  
fill the barrel with clean water in which a half pound  
of soda is dissolved. Boil for two or three hours  
and thoroughly wash out with fresh water. The only  
remedy for sand coming into your well that can be ap-  
plied easily is to drive several pipes of large size, made  
of the joints of dense well pipe, down to a lower  
stratum, leaving their tops below the low water surface.  
This will relieve the pressure that lifts the sand, and  
tend to increase the flow of the well.

(6) M. O. B. asks: After a fire stream of  
water has reached its natural height, how much higher  
can it be forced by steam fire engines, or in case the  
force of how be brought one hundred feet higher than  
the water's level, will that be any advantage in forcing  
water higher than when it is connected with steam  
fire engines, and then drive a three or four-quarter-inch  
pipe from the engine to the boiler, and the jet being  
between the engine being one hundred feet high, and  
water placed at base of building. A 75 ft. 70 ft. 60 ft.  
being pressure, you can drive a three-quarter-inch  
pipe one over one hundred feet high, while the hydro-  
static height due to the above pressure is one hundred  
and sixty-one feet, so that you could with the boiler at-  
tended to this height will throw a stream thirty or forty  
feet higher, the friction of the hose being the differ-  
ence between the hydrostatic height and the jet being.

(7) W. H. W. asks: Will you please in-  
form me through your valuable paper the best way to  
lay out and longest circular sewer, the most as the man-  
ples laid and larger, say up to 14 inches, and  
oblique constant reader? The way I lay them out is to  
between two main lines with a little oil on the sur-  
face, and temper them on a boiler spindle with the  
rod turned down so as to fit the hole in the sewer; in-  
side of the spindle is a gas drum, and as the roller be-  
gins to come the sewer I keep turning them until the  
required cut is obtained, then I lay them on a flat  
place with a little oil on it. Even when I get them flat  
in backings, they will go out of true in tempering,  
same as the samples received. One of them is too  
rough, but the other is very much so. By answering  
the above you obtain a constant reader. A. In lay-  
ing, the sewer should be carefully dipped planch-  
wise. If they draw or warp, use a smooth hand ham-  
mer on a hard steel block or steel. Carefully hammer  
the parts that draw so as to make the saw flat. If the  
cutter binds, hammer around the edges. If the edges  
warp, hammer the center to relieve the strain. The  
saw will bear the hammering after drawing the sam-  
ple.

(Continued on page viii.)

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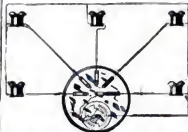
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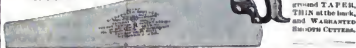
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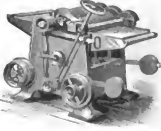
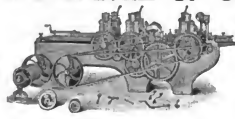
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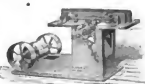


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Without any noise from the room.

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**American Brass & Metal Works,**  
MANUFACTURERS OF  
**BANK and OFFICE RAILING**  
Elevator Balconies, Elevator Cabs,  
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(Continued from page vii.)

(18) T. T. asks: Can you inform me how to clean the stove and flue from a waste pipe that carries off sewage water from a wash room? It is full both from gas pipe and cannot be got at, only at the inlet and outlet. Is there a chemical that will do the work? A. If the pipe is perfectly closed, there is no chemical that will open it, but if there is still an opening through it, a hot solution of lye poured into the pipe may clear it out. This preparation comes in sealed packages and can be bought at any grocery. If the pipe is closed, and you could work a wire through so as to run in the lye, it might do the business. Two caustic pots are far superior to the "lye" sold in the groceries. The name "caustic potash" is often printed on the labels of packages of caustic soda. You must get the real potash at the drug store.

(14) F. G. B. asks: Will you please tell me your answer to correspondence of a simple method for determining whether water from a device will be fit for drinking and cooking purposes, and can be used in a steam boiler in run an engine without injury to the boiler? A. There is no simple way. If the water is placed in a glass and some white sugar is dropped into it and all is left at rest, the appearance of a colored

deposit near the little pile of sugar is supposed to indicate a bad water. But the water can be bad without this happening. For besides the addition of three volumes of water to the original (one volume of the original sample), and on boiling no precipitate should appear (carbonates). These tests are also far from complete.

(15) G. R. W. says: The water in our recently finished cistern is hard. Add, of course, less of the cement. Can you, through your valuable paper, let me know what to do about it? A. As to what will destroy the taste of the cement? A. As to what water you use in the cistern, nothing can be done to destroy the taste of the cement or make the water soft. Empty the cistern of the present supply and the water hereafter will be better, if any, affected by the cement.

(16) M. J. H. asks: What is the comparative cost of tin, galvanized iron and copper for gas, and what is the comparative durability of each? Will they last longer if painted? A. The cost increases in the order named. Copper gutters will outlast the galvanized for many years. All will last longer by being painted every two years. The comparative cost will depend on the thickness of the metal.

(17) I. J. M., Syracuse, says: In one of the streets in this city is laid a water pipe 6 inches in diameter, with a pressure of 25 pounds; there are three fire plugs 40 feet apart with 2½ inch discharge guns. Engine No. 1 takes one valve one plug and runs pumping water. Engine No. 2 takes the plug 40 feet nearer the fountain head and also goes to pumping water. There is but water enough for one engine when the plug is open. There is an elevation of 10 feet between each engine. A claims that engine No. 2 will get the same water as the engine from station to plug as engine No. 1. B claims that engine No. 1, which is 10 feet lower, will get the same water. Which is right? The water pipe is 64 feet to the ground. A. Both engines will get water according to their ability to produce a vacuum in their suction pipe. The flow of water will also increase in the main equal to the additional head produced by the suction of both engines. The probability is, with the ordinary hydrant connection at the side of the main, that engine No. 2, next the source of supply, will get the same water.

(18) J. M. asks the different speeds a wood-turning lathe ought to run to turn the following work: a column 8 in. diameter, wheel 8 in. diameter and assial joint 1 in. diameter. A. Run all revolutions on a peripheral speed of 300 ft. per minute. This is as much as the tool will stand. For the three cases cited this will give speeds of 300, 150 and 1,000 revolutions per minute approximately.

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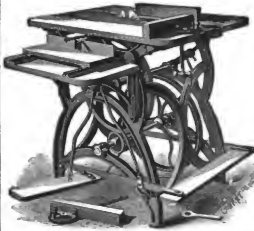
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Type No. 2 is 24 inches, circular plate  
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the diameter of the flange.  
Steel shafts. (Covers are all ma-  
chine work from solid iron. No  
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DO YOU SPECIFY IT?

EACH SHEET STAMPED, SQUARED, GUARANTEED.

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### Combination Warm Air and Hot Water Heaters.



Constructed on the most scientific principle, with down and indirect draft, and a larger amount of radiating surface than is possible in any other heater in the market. The enormous saving of fuel in the use of our furnaces is a very essential feature. Absolutely gas and dust tight.

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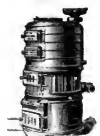
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CLASSIFIED ADVERTISEMENTS—Continued from page xv.

<b>Saws and Builders' Supplies.</b> S. H. French & Co.	Page 1	<b>The North Western Adamant Mfg. Co.</b> The Chicago Adamant Planter Co.	Page 1	<b>Shutter Workers.</b> F. S. Maloney	Page 1	<b>Ventilating Grates.</b> Burns & Sons	Page 1
<b>Mathematical Instruments.</b> F. W. Fisher	1	<b>The St. Louis Adamant Planter Co.</b> The Ohio Adamant Planter Co.	1	<b>Siding Laths.</b> T. H. Brown & Co.	1	<b>Ventilator and Steam Pipe Ring.</b> Geo. E. Reed	1
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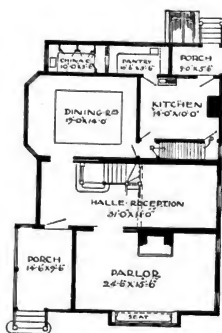
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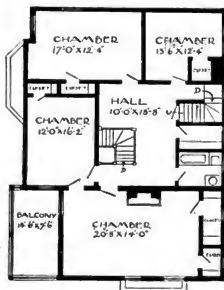
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No. 1.



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

A RESIDENCE AT CLEVELAND, O.

[See page 84.]



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## LAWN PLANTING: HOW TO DO IT AND WHAT TO AVOID.

After their houses are built, most owners begin to give practical consideration to their surroundings. Chief among these, as regards their appearance, is the planting of the ground, if there is to be any about the house. They are wise who do some of their planting before the house is built, if they have the opportunity, for although skill and care avail much, they cannot give the growth to trees that time alone produces, and if we can get one or more years' start of the builders, a great gain will be made in house feeling and attractiveness when the house comes to be occupied. The great impediment to the advance of landscape work about American houses is the ease with which most of our people accept bad work and are satisfied with bad results. They go to the nearest man who calls himself a gardener or florist, receive and pay for what he chooses to do for them without question or hesitation. However good these men may be as propagators or cultivators, there is not one among a thousand of them who has any idea of what constitutes a good design, or of the principles of landscape gardening, or good taste, even if they have been employed about such work for years. As well might we employ a blacksmith to plan stoves because he makes good horseshoes. The advice of a man of experience and education in these things is always best, even if we cannot have him superintend the work. He will usually save us more by

caution of the merits of different trees and shrubs would take a volume if justice was done them, and the lists so often given are good for a limited locality only; but a little practical observation of what does well in the neighborhood or similar localities will be of the greatest assistance. If, after a fair trial, we find a thing does not flourish, but presents a poor appearance, remove it and replace with something good. Our grounds will not have a wholesome, clean appearance without healthy vegetation. Some localities will allow a much larger and better selection of varieties than others, but the principle holds good wherever a house may be built.

In planting especially we must "think ahead," and arrange in our plan those trees that may eventually be expected to grow large and want much room, such as elms, oaks, maples, and tulip trees, that they will not have to be sacrificed or crowded out of shape in after years just as they begin to develop their highest beauty. Often on small places the only available situation for large-growing trees is between the side walk and road, and here plenty of room between large-growing ones, but they may be planted twice as near if quicker shade is wanted, and alternate trees cut out as soon as they begin to crowd. It requires faith in trees and courage to this extent, after a growth of some years, even if they were originally planted with the intention of doing so, for mistaken tree lovers are

arrange our trees and groups to keep it out of sight. If well done, their use will never be obtrusive. If we are fortunate enough to have no objections of this sort, we need only arrange so as to leave unobstructed the finest outlooks and practice our skill in developing the best foregrounds. If we wish seclusion from intrusive neighbors or too inquisitive passers-by, we can well contrive a screen of trees and shrubs that will serve the purpose. It is often best to choose evergreens for this use, particularly in the Northern States. Shall we want protection from high winds? If so, we may want a wind break. Trees to the north of a house protect it from cold winds and do not keep off the sunshine. We want shade, but not so much directly about a house as to prevent the sunshine reaching it, and to stop the growth of grass. This must be thought about in arranging large-growing trees, and in no locality where the summer weather is hot must we obstruct the cooling breezes immediately about the house.

Unless we adopt an elaborate geometrical plan of laying out our grounds with hedges, clipped shrubs, and things in exact order (a system which certainly has attractions to recommend it, for certain situations, in spite of all the opposition and ridicule that has been directed against it), we should avoid anything like formality in our lawn planting.

Let us insure good open spaces of clear view. The larger, the better will be the effect. Especially on



LAWN PLANTING.—FROM A PHOTOGRAPH TAKEN AT NEWPORT R. I.

avoiding mistakes that would otherwise be made than his assistance costs. Obviously the best time to escape mistakes and bad effects is when the work is being done. Have a well considered plan, whether the work to be done is great or small. A matter of such far-reaching importance should only be entrusted to competent hands. There is no better field for ingenuity, because results are often years in developing, giving them all the chance they want to escape the results of ignorance and incompetency to themselves.

There are too hard and fast rules about landscape planting, but there are some principles that should be regarded; for if neglected, we will never have the most satisfactory results. Keeping in mind the general broad effects we wish to produce, we should direct our efforts to perfecting them; details will easily arrange afterward, but mistakes in design and placing of trees are fatal to best results. With perhaps the exception of two places on a dead level with similar buildings, every place requires separate study as to a plan of operations best fitted to bring out its advantages, and to the skill with which this is done is mainly due the ultimate success. If we are at work on a large country place, there is more scope for our abilities; but on small areas we should avoid the common error of attempting too much. If we hope to accomplish "much in little," we must use our brains the more. We must consider the wants and capabilities of the situation, the needs and tastes of the coming occupants, avoid curiosities and untidied novelties, that are well enough for botanists and experimenters but only a discouragement on the generality of grounds. Most people want freshness and growth, and care little for ugly mutilations. A dis-

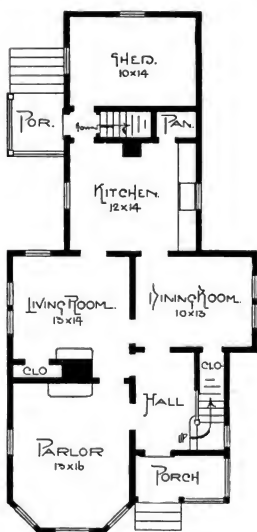
almost sure to protest. It is better to have them twice too near and then thin them out, than to have them planted on twenty-five or thirty feet and then have them crowd or leave great gaps where removed, that the living generation will not see grow together. Sometimes short-lived, quick-growing trees, like willows or poplars, are used alternately with the more permanent kinds. This is advisable in some situations, but an avenue or country road never presents so fine an appearance as when the bordering trees are all of the same variety and characteristics regarding shape and size.

Trees and grass are our main dependence in giving finish and elegance to our house surroundings. With them alone beautiful effects are produced. The art of placing them so they not only display their individual beauties, but harmonize and emphasize the best points of the whole plan, is the best work of the true landscape artist. Shrubs and vines come next in usefulness, attractiveness and permanence, but a good lawn partly overhanging with fine shade trees is the main consideration. These take time and labor to attain, but are more lasting in their beauty than other things, suffer less from temporary neglect, endure drought and floods better, and remain with us during a lifetime. In making new places there is often a mistaken delay in waiting until the house is built before asking advice of a landscape gardener. His suggestions in regard to the position of the buildings often add greatly to the convenience and appearance of the place. When the house is built, however, we must make the best of it. In making plans for planting let us first consider what there is disagreeable in view from the place, and

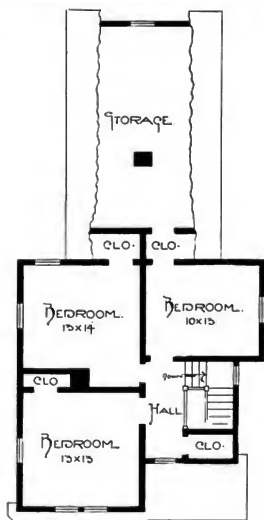
small places should we allow unobstructed views across the whole expanse of the lawn. The house should stand about with an irregular belt of trees and shrubbery in such a way as to conceal them, unless they run into adjoining grounds or raddles of the same character, where no visible division line is the best one we can have. Their actual extent to the sight should appear undetermined. It is astonishing what an apparent extent can be given to small places by skillful planting. If there are no buildings or other high objects in close proximity, it can often be made a perfect success, and a feeling of space given that is delightful. Trees on adjacent places and grounds of suitable character can often be made to contribute to the effect in a happy manner. If we must have fences, let them be as unobtrusive as possible and of a dark, inconspicuous color.

In grading the great thing is to do as little as possible. No operations in landscape gardening are so expensive and usually unsatisfactory as moving large quantities of earth. An artistic conception of the best effect that can be produced under given conditions is most valuable. The good effects of the planting can often be greatly heightened by having the lawn rise somewhat as it approaches the bordering of shrubs, which, when they crown a rising slope, can be given most beautiful outlines against the sky. Long, easy lines of grade are most admired, whether we look up or down upon them. A dead level is not good, but the appearance of a near approach to one in the open center is much to be desired. The necessary digging for building operations and road making renders more or less grading inevitable, and by a carefully considered plan the earth can

(Continued on page 36.)



FIRST FLOOR.



SECOND FLOOR.

[See page 34.]

A DWELLING FOR \$1,900.





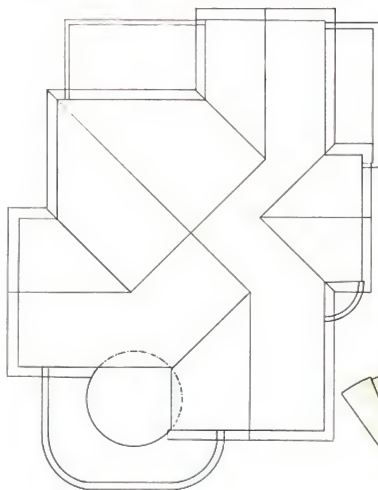
A COTTAGE AT SEA SIDE PARK.







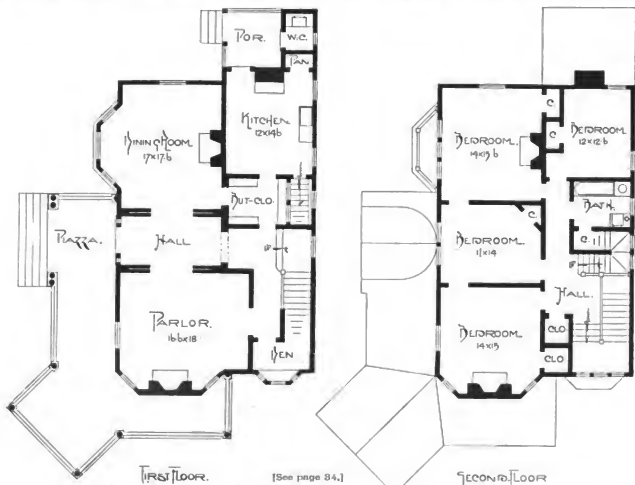
A COTTAGE FOR FIFTEEN HUNDRED DOLLARS.



ROOF PLAN.



FLOOR PLAN.



A COTTAGE AT ASBURY PARK.



## THE ODD FELLOWS' TEMPLE, CHICAGO.

The new temple soon to be built in Chicago by the Odd Fellows of the State of Illinois is to be one of the most imposing structures of its kind in the United States, and the tallest building in the world. Rising to a height of 556 feet, the tower will be visible at a distance of sixty miles, and every available foot of space will be utilized. Upon the ground floor the area covered will be 45,000 square feet, and the total area inclosed by the various floors, exclusive of walls, partitions, corridors, etc., will be something over 350,000 square feet.

Twenty stories of the building will be included in the main structure, while the tower is to be fourteen

stories high, and, like most of the rest of the building, will be devoted to offices, eighteen elevators and four stairways giving access to the topmost floor. Five floors of the building are to be devoted to lodge rooms and public halls, among the latter being a drill hall, with an area of 5,000 square feet. — *The Graphic*.

## A Suggestion for Inventors.

A correspondent, who lives in the distant colony of Tasmania, Australia, indicates his troubles in land clearing, and calls for inventions as follows:

Could you publish in your SCIENTIFIC AMERICAN the best devices for felling trees and cutting them up when down, say from two to four feet in diameter?

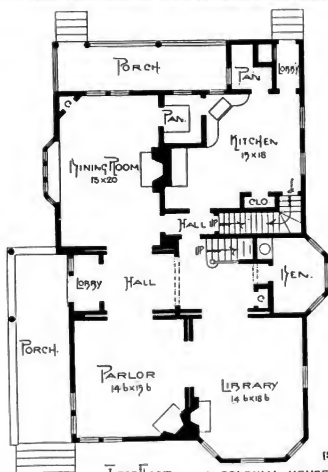
We have an immense lot of timber on the land in Tasmania. When a selector takes up a block of land, the device we have is to fell the trees with an ax, and, when down, two men cut them up into say 15 ft. lengths with a cross-cut saw, roll them together in heaps and burn them. The timber is of no value, there is so much of it. There are as many as 400 and 500 trees per acre, averaging about 8 ft. in diameter and about 30 ft. in height. They cost the selector about five dollars per tree to get rid of them; so you will see that it is not all sunshine with the selector in Tasmania. What we want is something to reduce the cost per tree; or, in other words, some device other than felling them with the ax, as it is so laborious.



THE PROPOSED ODD FELLOWS' TEMPLE AT CHICAGO.



SCIENTIFIC AMERICAN.



[See page 84.]

A COLONIAL HOUSE AT PORTLAND, ME.





[See page 38.]

A COTTAGE OF MODERATE COST.

## AN ENGLISH COTTAGE.

We are indebted to the *Building News*, of London, for the sketches herewith given of a cottage at Bilston, Bromley, Kent, Evelyn Hellicar architect. The design presents a number of noticeable features and suggestions. The hall and stairway thereof are quite attractive. If built of brick, in a solid, substantial way, such a house would cost here about \$8,000; but if constructed in wood, a less sum. As here shown, the walls, to about the height of the first floor, are faced with red bricks; above, the walls are hung with weather tiles of a good red color, the same being used over the roof. The ground floor accommodation will be seen by the plan. The first floor contains five bed rooms, dining room, hall room, etc. The illustration is from a drawing shown in last year's Royal Academy.

The theory of sound has been pretty well worked out; but the difficulty lies in applying it to the real world, with its varying sizes, shapes, materials, and details of different buildings. It is not so much that the principles of acoustics are unknown as that the working out of their results, in any but the very simplest cases, forms too complicated a problem for practical solution. Some writers on the subject, though not usually the scientific ones, profess great faith in strict numerical relations between the length, width and height of an interior. They would have us believe, for instance, that if a building is 80 ft. long, 40 ft. wide, and 40 ft. high for if its length, width and height are other multiples of 4, 5 and 7, it is sure to be successful for speaking in. Practice, as might be foreseen, does not support this fancy, and in the case supposed every thing would really depend on the materials, and on the treatment of the internal surfaces. Moreover, the taking away of 2 ft. or 3 ft. either from length or width of such a building, which on this supposition ought to destroy its acoustic merits altogether, is, in fact, more likely to improve them. And, again, the principle, such as it is, becomes unworkable when one has to apply it to any but a plain, oblong room, with a flat ceiling, a room which, of all others, is apt to be the worst for speaking in. What, for instance, are we to consider the length, and what the width, of such a plan as A or K or L, and at what points must they be measured? Yet such ideas as these are incomparably better, as regards acoustics, than the plain oblong which the hypothesis presupposes.

But, on the other hand, a building which is to be successful for speaking in must have all its dimensions within certain general limits, regulated by the distance to which an average voice can be distinctly heard. Sir Christopher Wren considered this distance to be at least 30 ft. in front of the speaker, 20 ft. behind him, and 30 ft. on each side. This is doubtless, as regards the length, a very moderate estimate, and might fairly

be increased by 20 ft. or more. At the Metropolitan Tabernacle, Newington, which is 80 ft. wide from wall to wall, and 150 ft. in extreme length, internally, an exceptionally good voice is audible throughout. In this case there is, in the upper part of the building, a length of nearly 130 ft. in front of the speaker. On the ground floor and lower gallery, however, the extreme distance from him is only about 100 ft.

In buildings of a length like this, the chief difficulty is to conduct the sound to the farther end, and by all practicable means to prevent its being lost and deadened. For this purpose, wooden linings to the walls have been employed, and a ceiling squircular in section. Echoes have also to be carefully guarded against,

common, are much lessened by chairs or pews, and destroyed by the presence of a full congregation; and by the use of carpets, cushions, etc. These, therefore, are comparatively harmless. The troublesome echoes are those from walls, and roofs or ceilings.

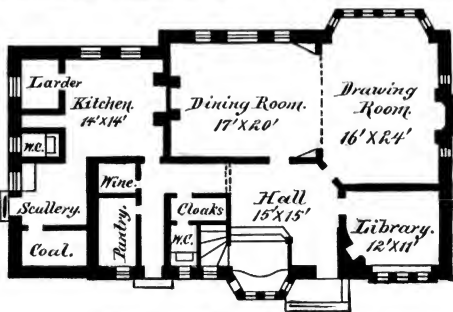
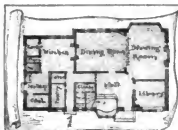
A flat, unbroken end wall, facing the pulpit, is pretty sure to reflect sound unpleasantly. This is so well known that an end gallery is often put in, less for its utility than with a view of preventing this evil. Any scheme, however, which will break the wall surface up into projections and recesses will answer the same purpose, and perhaps in a more architectural way. The corners of an oblong building, too, are great lurking places for echoes, particularly if the building is destitute of columns.

For this reason, corners of this sort are sometimes cut off obliquely, and at other times are broken up with projecting piers, which will have the same effect in a different way. The sides of deep transepts, again, facing the speaker, are likely to act as a flat end wall as if proper precautions are not taken.

And if, occasionally happens, the building narrow, even a very little, from one end to the other, or, in other words, is slightly wedge-shaped, there will be much danger of reverberation from the side walls, if the pulpit is put at the wider end. With a pulpit at the narrower end, wedge-shaped buildings have the reputation of being acoustically good.

A curved wall facing the speaker is commonly as bad as, or worse than, a flat one, provided, of course, that it is not effectively broken up by projections or recesses; and the same thing may be said of a polygonal one. It has been assumed, so far, that the building is without columns. For though columns when ill placed cause much obstruction to sight, they do make considerable atonement for this fault by breaking up and doing away with echoes. Moreover, it is quite possible to get the good from them without the evil, although, on the other hand, with unskillful treatment, it may happen that the evil remains without the good. The same principles that apply to walls apply to roofs and ceilings. All planes that face the speaker should be thoroughly broken up, and no flat or concave surfaces should be allowed in this position. The right angle between a wall and a flat ceiling is usually as bad for sound as the right angle between the two walls, and should be avoided in an analogous way. An angle at the ridge of a roof also leads to confused reflex, unless the pitch of the roof or ceiling be extremely low. Very obtuse angles are not objectionable. Anything like a large internal dome should be greatly broken up by ribs, coffers, or similar features. And internal roofs, if curved, should not be too high. A lofty space behind the pulpit is particularly bad, unless it has an open or closed screen across it, or is occupied by an organ.

To keep out rats and mice put in the lower part of the partitions a filling one foot high of mineral wool.



AN ENGLISH COTTAGE, BILSTON, BROMLEY, KENT.

especially from the end facing the speaker. But, in places of a smaller size, and of moderate height, means for conducting sound are not required, and echo and reverberation are the real dangers to be feared. In an interior where the farthest seat is not more than 40 ft. or 70 ft. from the minister, everybody may be considered within direct range of his voice. Wooden wall linings would do more harm than good, but careful study is needed to prevent the voice from being reflected back.

Echo and reverberation, which is only an echo or series of echoes, within too small a compass to be clearly heard as such, come mainly from even and unbroken surfaces. The surfaces may belong to either walls, roofs, or floors. Echoes from a floor, which are very

## A RESIDENCE NEAR NEW YORK.

On page 43 will be found illustrations of a residence recently erected for W. E. Carhart, Esq., at Belle Haven Park, Greenwich, Conn.

**Household:** Front, 30 ft. 6 in.; side, 46 ft. 6 in., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The design is an admirable one for a country house, and it is provided with a spacious piazza, porte-cochere, and port at second story. Underpinning built of blue stone. Exterior throughout is clapboarded and painted colonial yellow, with ivory white trimmings. Piazza posts are turned out of yellow pine and are finished natural with hard oil. Blinds painted bronze green. Roof shingled and painted red. The interior contains many large rooms. The first floor is handsomely finished in antique oak, the ceiling of reception hall being laid in panels. The broad, low staircase, antique mantel, and paneled divan are the features of hall, while the circular bay window, with seats, in drawing room, is in keeping with the several wide-placed transoms and beaded windows. Staircase is lighted with three stained glass windows. Library is provided with bookcases, built in on either side of fireplace. Dining room, good sized and well lighted, contains a screen for buffet. Reception room, where shown, are finished with tiled hearths and colonial mantels. Butler's pantry is 11 ft. by 12 ft., and is properly fitted up with built-in cupboards, drawers, and butler's bowl complete. Kitchen is wainscoted, and it contains sink, range, two large pantries, and lobby large enough to admit ice box. Back stairs to second story start from kitchen, and beneath these the stairs to cellar descend. There are five bed rooms, dressing room, and bath room on second floor, and four bed rooms on third floor. These apartments are trimmed with white wood finished natural. The floors are of hard wood. Cement-cellar contains furnace, laundry, store room, servants' bath room, and other apartments. Cost, \$11,000 complete. Messrs. Boring, Tilton & Mellon, architects, New York.

Our engraving was made direct from a photograph of the building, taken especially for the SCIENTIFIC AMERICAN.

## Timber in Swamp Places.

The surface of all timber exposed to alternations of wetness and dryness gradually wastes away, becoming dark colored or black. This is really a slow combustion, but is commonly called wet rot, or simply rot. Other conditions being the same, the most dense and resinous woods longest resist decomposition. Hence the superior durability of the heart wood—in those the pores have been partly filled with lignine—over the open sap wood, and of dense oak and lignum vitae over light poplar and willow. Hence, too, the longer preservation of the pitch pine and resinous "jarnah" of the East as compared with non-resinous beech and ash. Density and resinousness exclude water, therefore preservatives should increase those qualities in the timber. Filled pits fill up the pores and increase the density. Staves from oil barrels and timber from walling ships are very durable. The essential oils resinify and furnish an impervious coating. But pitch or dead oil possesses advantages over all known substances for the protection of wood against changes of humidity. According to Prof. Lethely, dead oil, first, regulates albuminous substances; second, absorbs and appropriates the oxygen in the pores, and so protects from creosote; third, resinifies in the pores of the wood, and thus shuts out both air and moisture; and, fourth, acts as a poison to lower forms of animal and vegetable life, and so protects the wood from all parasites. All these properties specially fit it for impregnating timber

exposed to alternations of wet and dry states—as, indeed, some of them do—for situations damp and situations constantly wet.

Dead oil is distilled from coal tar, of which it constitutes about 930, and boils between 300 and 430 Fahr. Its antiseptic quality resides in the cresosote it contains. One of the components of the latter, carbolic acid (phenic acid, phenol) C<sub>6</sub>H<sub>5</sub>O, the most powerful antiseptic known, is able at once to arrest the decay of every kind of organic matter. Prof. Lethely estimates this acid at  $\frac{1}{2}$  to 6 per cent. of the oil. Cresylic acid C<sub>10</sub>H<sub>7</sub>O, the homolog of carbolic acid and the other component of cresosote, is not known to possess preservative properties. While an external application of coal tar promotes the preservation of dry timber, nothing can more rapidly hasten decay than such a coating upon the surface of green wood. But this mistake is often made, and dry rot, instead of wet rot, does the work of destruction. Carbonizing the surface also increases the durability of dry, but promotes the decay of wet timber. Farmers very often resort to one of the latter methods for the preservation of their fence posts. Unless they discriminate between green and seasoned timber, these operations will prove injurious.

## They Bought Burning Houses.

One of the strangest business in ancient Rome is

in volume of the gases, as otherwise cold air from the top would descend to fill the vacancy left by the contraction of the gases, and the draught would be checked. Reasonable as this theory seemed, practice has shown that cylindrical boiler or furnace flues are at least as good as the tapered ones, and within a few years practical engineers and architects of experience in such matters have inclined to make them slightly larger at the top than at the bottom, the increase in diameter being, perhaps, half an inch to ten or twelve feet. Recently, a Swiss engineer has made experiments to see whether the facts bear out the old rule or support the more modern practice. To make the test, he built a chimney over a furnace grate, the stack having two flues. One flue tapered upward and the other downward, and the flues opened side by side over the grate, with openings of the same size. On lighting a fire on the grate, with unlimited access of air under it, the smoke was seen to issue nearly equally from the top of the two flues, but with an unmistakable preponderance in favor of the flue which enlarged toward the top. On partially shutting off the access of air to the fire, the difference became much more marked; the current in the flue tapering upward diminished, and finally stopped altogether, the smoke finding its way entirely through the flue with the wider opening. It was then made to see whether the current in the flue

with the upward diminution could be restored by partly shutting off the other. A damper was arranged at the top of the wide-mouthed flue, and gradually closed until the smoke tapered even after nine-tenths of the orifice of this flue had been shut off, no current was started in the other, and it was only after the wide-mouthed flue had been entirely closed that the smoke began again to pass through the tapering one. We believe that the old theory is entirely made to conform to the facts by explaining that the friction of the smoke against the sides in such low flues is in a chimney tapering downward than in one tapering upward; but, however this may be, there seems to be no doubt that the downward taper is more favorable, under ordinary circumstances, than either a uniform section or one diminishing toward the top. What the most favorable rate of increase is does not seem to be yet determined. The foreign experimenter, whose report in the *Schweizerische Bauzeitung* has been extensively copied, thinks that an increase of diameter at the top of about one inch to one hundred and twenty-five inches in height of flue is not too much; and he considers that ventilation flues may, with advantage, be increased in capacity at a still more rapid rate. —*Amer. Architect.*



AN ENGLISH COTTAGE—THE HALL.

mentioned by Juvenal in his "Satires," and we hear of it also, as a writer in the *Evening Standard* observes, from historians. It consisted of buying houses on fire. The speculator hurried to the scene, attended by slaves carrying bags of money, and others carrying tools, judged the chances of salvage, and made a deal to the distracted house owner, who was glad to accept anything, as a rule. The bargain struck in all haste, this earliest of fire insurers set his slaves to work and secured what he could. Sometimes even he put out the flames, and so made a coup. It was a business for capitalists, but the poorest who speculated in a small way could hardly lose if he had presence of mind enough to grasp the chances. Thus Cato the Elder, and above all, Cæcilius, laid the foundations of their great wealth. The latter had a pool, for such gambling. He gradually collected a force of carpenters, masons and such artificers—slaves of course—who reached 500 men. Not only did he buy houses on fire, but, also, enlarging upon the common practice, he made a bid for those adjoining which stood in danger. His proposals were commonly welcomed, we learn, so helpless were the people and so great the peril. By this means Cæcilius became the greatest owner of house property in Rome.

## The Taper of Chimneys.

The old rule about chimneys was that they ought to have the flue tapered to the top, on the theory that, as the hot gases in them ascended, they cooled, and, in cooling, contracted; and that it was important to reduce the size of the flue in proportion to the reduction

## PATENTS.

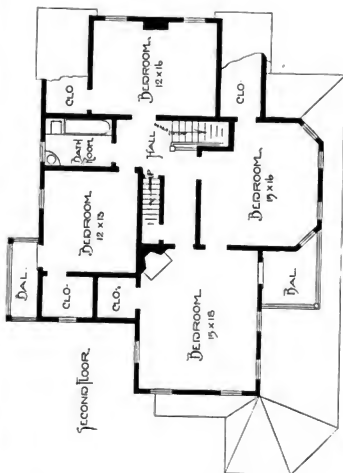
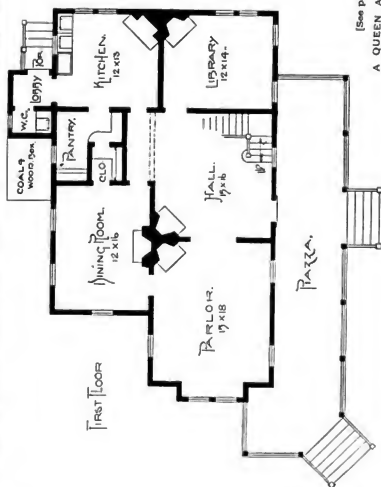
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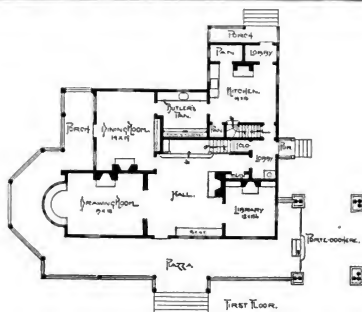
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[See page 35.]

A QUEEN ANN COTTAGE.



A RESIDENCE AT BELL HAVEN PARK.



## A RESIDENCE AT EAST PARK, McKEESPORT, PA.

We give herewith from the *Journal of Building* a sketch of the residence of E. E. Douthett, Esq., at the above place. F. C. Seuer, Pitsburg, Pa., architect. It is a very satisfactory exterior design, and a glance at the floor plans shows a well arranged and comfortable interior. We estimate the cost of the complete, at about \$4,000.

## Stained Cypress.

The use of cypress for interior work has heretofore been almost exclusively confined to a hard oil finish, and in some instances architects have objected to the color of the wood.

To meet this objection a local concern has recently been making some experiments in staining cypress, just as cherry, mahogany, and other first-class finishing woods are frequently stained to bring them to the desired color. Several pieces of cypress were given to a local factory, with instructions to finish them in as many different shades, and in the best manner possible. These pieces have just come from the hands of the finishers, and the results are in every way satisfactory. The workman says that the wood takes the stain as well as any wood they have ever finished, and think there is not the least question about the durability of the color. Of course, this last is a question which time alone can

cypress when finished, but it brings out the grain of the wood more clearly, and its use will doubtless find favor among architects and builders.—*Timberman.*

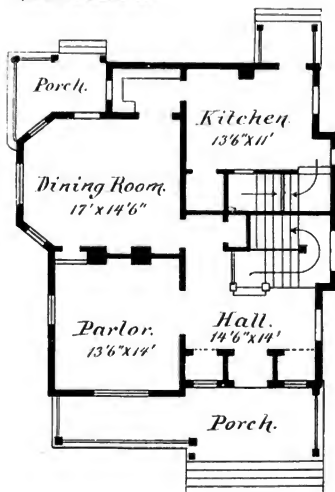
## Low Ceilings.

A reaction has lately taken place in favor of low

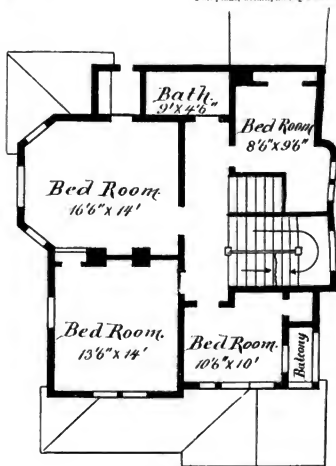
life and hygiene, have not been lacking in support of low-ceiled rooms. Low walls to rooms, it is said, are being advocated in England as really affording better ventilation throughout, in preventing the formation of upper strata of all but immovable foul air, and tending to prevent draught. The idea is very gladly taken

up by some of the art journals, who rejoice that we have probably gone to the extreme in the height of apartments, which has the disadvantage of dwarfing the furniture which is placed in them; which also fail to secure the most pleasing proportions to rooms not having any larger area. There is a consensus in a low-ceiled room which in a high-ceiled room is sacrificed to emptiness. In discussing this point reference is often made to the time of Queen Elizabeth and the low wainscoted rooms that prevailed at that period. Low ceilings were the rule, and comfortable interiors rather than imposing exteriors were studied.—*Architectural Era.*

In connection with the publication of the BUILDING EDITOR of the SCIENTIFIC AMERICAN, Messrs. MUNN & Co. furnish plans and specifications of buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifications



Plan of First Floor.



Plan of Second Floor.

## A RESIDENCE AT EAST PARK, McKEESPORT, PA.

definitely decide, but the possibility of the color fading or wearing off is a very slight one, and hardly worth considering in the face of the opinion of men with years of experience in finishing woods in this manner.

Finished in the natural color, cypress is often compared with pine in appearance, but when stained this resemblance is entirely destroyed, and there is no other wood with which a comparison can properly be drawn. The stain not only adds to the rich appearance of

ceilings. Not very long ago architects, sanitary engineers, and physicians were almost unanimous in favor of high ceilings for rooms in dwellings. The arguments in support of lofty ceilings were numerous, some of them based upon the superior healthfulness of such rooms, and others upon the superior architectural effects obtained. With the introduction of the cottage style of architecture, ceilings have gradually become lower, and, the fashion having been set, reasons, sci-

entific for the various buildings illustrated in this paper can be supplied. Those who contemplate building, or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with this undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Munn & Co., 361 Broadway, New York.

## AN IMPROVED WORKING MACHINE.

The economical forming of baluster posts, mouldings, panels and the various forms of ornamental wood work which the architect and house builder now introduce so liberally in all handsomely finished structures,

has become an object of very great importance, and several machines have been successively introduced to perfect this class of work, while reducing its cost to a minimum. One of the latest of these machines is shown in the accompanying illustration, together with various figures representing work done on the machine. It is the new fluting and twist machine made by P. Pyral, numbers 512 to 524 West Fourth-street, New York City. It will produce all kinds of spiral or rope mouldings, either straight, tapered, curved or oval, making right, left, and pineapple cuts, and doing straight fluting. It will cut soft or hard wood from one to six threads on a piece, and make any degree of twist, from one turn in one and one-half inches of length to one in ten and one-half inches. The cutters are similar in shape and arrangement to those used on variety shapers, and are made of the same steel. They are held between collars that are somewhat similar, but so arranged that the knives have a peculiar action, cutting from the outside in, and making a smooth cut, even against the grain. They revolve always in the same direction, whether the twist be right or left, and one set will produce several different shapes of work. This machine will swing eight inches, and will take 60 inches between centers.

A modification fluting attachment will produce radial fluting on flat work up to 9 inches square or 12 x 12 oblong. This fluting can be either perfectly flat or can be swelled or waved. It can run direct to the center or tangent to a central circle.

A very handsome class of screw work, known as the "Moorish" pattern, consists of long, thin spirals, interwoven like wire netting. The spirals for this work are generally considered very difficult to make, the trouble being to support the long light sticks against the cut. This machine is designed to make this light work as well as and as rapidly as it does the heaviest.

## A FINE MACHINE FOR CABINET SHOPS.

The machine shown in the illustration, made by Messrs. Frank & Co., of Buffalo, N. Y., is designed to plane 30, 36, and 42 in. wide and 6 in. thick, on one side only. It has two top cylinders, one to do the rough work and the other for polishing. The roughing cylinder is belted from both ends, the other from one end. Two knives are used on each. The heads are made from steel forgings and lipped to prevent tearing the timber. The bearings are all 2 in. diameter and 8 in. long, except the one on finishing head

next to driving pulley, which is 12 in. long. The finishing cutter head is set 1-32 in. below the roughing head, and as all the dirt, etc., is taken off by the first head, the knives remain sharp for a long time. One can feed this machine 30 lineal ft. per minute, and do the

be taken up by a strong gib at each end of the machine. The bed is raised and lowered by means of two 1½ in. square thread steel screws, 4 threads to the inch. The machine must be belted from above, and a countershaft

with our improved self-aligning brass-bushed loose pulley is furnished with each machine. Three speeds of feed are furnished with each machine. Floor space required, 6 by 8 ft. Weight of machine, 5,500 lb. Countershaft has 12 by 6½ in. tight and loose pulleys and should run 1,000 revolutions per minute.

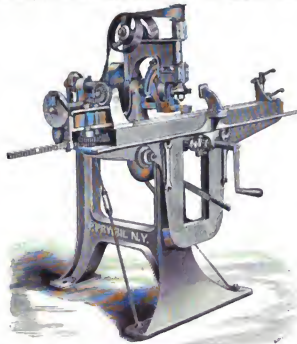
## Sawyer's Dumb Waiter.

This is a style of waiter which has met with great favor during a long period of years. It is not likely to get out of order, and runs easily. The car is held in position at each story by an automatic catch. It is manufactured by M. B. Sawyer, No. 120 Twentieth Street, Chicago, and is highly recommended by leading architects, builders, and house owners.

## Graphic Representation of Strains.

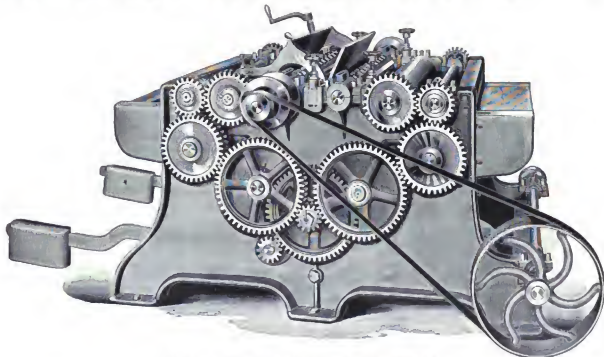
The vertical shearing stress of a beam at any point is known to be equal to the weight on the next pier less the weight lying between this pier and the point. It is generally represented graphically for each point by ordinates to the line of beam on one side only. Now, as the sum of these stresses must be zero, those on one side being positive and those on the other negative, the proper graphical representation is to show them according to these signs above and below the line of beam. This leads to a simple geometrical construction for finding the shearing stress when the beam is loaded in any way with a number of weights, single or distributed. Find the line of shearing stress for the beam itself; then, using this line, plot on it the line of shearing stress for the first weight, making the ordinates vertical to the line of beam itself. Plot from this second shearing line a third shearing line for the second weight, and so on. The shearing line last found gives the stresses arising from the weight of the beam and the weights for each point. The construction gives the line of shearing stress at each step and for each weight also. When the shearing is a maximum, the bending moment is zero, and where the shearing stress is zero the bending moment is a maximum; consequently, that point where the line of shearing stress intersects the beam is that of the greatest bending moment. The areas between the line of beam and the line of shearing stress above and below are equal.—*The Architect.*

Pepper was known to the ancients. In the middle ages it was one of the most costly of spices, a pound of it being a royal present.



## AN IMPROVED WORKING MACHINE.

finest kind of work, and by using a saw feed the doors for cabinet work, etc., can be planed as well as on a diagonal planer. This makes it a very desirable machine for a door factory as well as a cabinet shop. Both heads have yielding chip breakers or pressure bars on each side of the heads, which helps to secure perfectly smooth work. The feed rolls are 4½ in. diameter, and all driven. The bed is cast in one piece and set into the frame 1½ in. deep, and all play can



FRANK &amp; CO.'S CABINET PLANNER AND POLISHER.

## AN IMPROVED DOOR HANGER.

The hanger shown in the accompanying illustration is adapted for use with either heavy or light doors. It is the fourth invention of Mr. Warner in this line, has anti-friction bearings, is adjustable and noiseless, and the track is of hard wood. It has an automatic gravity lock. In hanging, after the base plate is secured in place, the door is coupled to the hanger by simply sliding the parts together, when the gravity lock, of its own weight, falls and locks them in place. Having but a single track, the carpenter has but one partition to

furnish fitted to machine, and placed in such a manner as to allow the use of extra long bolts.

The carriage is made in one piece, and although very rigid, works with the greatest ease and comfort to the operator. It is provided with gauge rod and stop by which the work may be gauged. The table is very wide, and runs on extra long slides with flat and V ways.

## The Baths of Diocletian.

The magnificent bathing establishments, called *Thermae*, to distinguish them from the ordinary baths in Rome, consisted of a long series of halls, chambers, and courts, all lying on the same level, so that the extent of surface required for laying out had to be artificially constructed either by the removal or elevation of the soil. The *Thermae* founded by Diocletian and Maximian, and completed by Constantine and Maximian, was the largest edifice of this kind. At present only the great hall, converted into a church by Michel Angelo, exists in a state of tolerable preservation. As the massive granite pillars, though so sunk into the ground that their full height is nowhere visible, are still standing, the antique, vaulted roof has also been preserved entire. This circumstance is of great importance for the lighting up of this vast space, the masses of light falling upon it as if from an angle that the mind receives the same pleasing impression at all hours of the day and at all seasons of the year. Several considerable portions of the adjoining halls are still to be seen, but being included within the buildings of the neighboring convent, a clear and complete survey of them cannot easily be obtained. A system of buildings of this species cannot be made intelligible till we have had the opportunity of examining the ruins of the *Thermae* of Caracalla, these ruins not having been discovered by any modern additions. The wide, open space behind the *Thermae* of Diocletian was not built over in ancient times. We must picture it to ourselves as simply surrounded by walls. At the extreme ends of these, on the side nearest the circular buildings were erected, one of which has since been converted into the church of St. Bernard. The space extends in the form of a half circle. Here must have been erected the seats for the spectators who wished to be present at the exercises of the palestra held in court. In order to form a level surface so extensive considerable substructions must have required here, such being absolutely necessary for this semicircular enlargement of the court. The church of St. Maria degli Angeli, with its high gables, makes an imposing impression in the distance, and is,

perhaps, the only edifice in Rome capable of giving us a lively idea of the solemn aspect of this species of ancient buildings. The masses which here meet our view differ essentially from those of the *facades* of modern churches, inasmuch as they have not actual reality, are of a more constructive character, and announce themselves as what they are; while the latter rather conceal than display the true significance of the building which they ostentatiously adorn, and serve rather to perplex than to regulate our conception of the concrete idea, which had thus created for itself an organic external form. From their detailed situation, these *Thermae* are visible from almost every spot in ancient Rome commanding an open prospect, and are, therefore, peculiarly adapted to serve as a landmark for the stranger amid the world of ruins.—*The Architect*.

## THE STANLEY PLUMB AND LEVEL.

A new feature in levels is shown in the accompanying illustration. It is the introduction of a shallow groove lengthwise of the two sides to the wooden stock, giving



STANLEY'S PATENT HANDY PLUMB AND LEVEL.

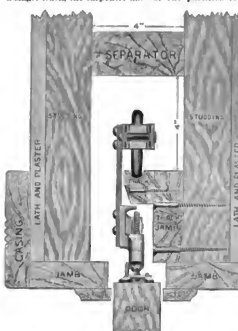
better means of grasping the tool when used for leveling or for ascertaining a plumb. This level has just been added to the assortment made by the Stanley Rule and Level Co., New Britain, Conn.

## The Diamond Match Company.

That wonderful combination known as the Diamond Match Company recently held a meeting of its stockholders in Chicago. Of the 60,000 shares of the company, 44,395 were represented. Vice-President Moore said that during 1891 the company had earned \$200,000 above its dividends and interest charges, and its business for the ten years beginning with 1881 showed an increase of 128 per cent. He therefore urged an increase of the capital stock from \$6,000,000 to \$7,000,000, as the purchase of additional pine lands and improvements of the company's plants had been required by the exigencies of the business. J. H. Constock, who has charge of the company's lumber interests at Ontonagon, Mich., gave an extended account of the situation there. The location of the company's holdings is such that it virtually controls the lumber trade of the river, and it is likely to be called upon in the near future to handle and saw all the lumber floated down the stream. Of the present pine timber holdings of the company, he estimated that it had enough for five years' consumption at present rates; recent contracts for new purchases would increase it to twenty more. The section in which the pine lands of the company were situated had suffered some from forest fire during the year, but the holdings of the company were pretty well scattered, and the loss to it would be light, most of its timber secured being for the most part available.

The following officers were elected: President, O. C. Barbour; Vice-President, William H. Moore; Treasurer, J. K. Robinson; Secretary, H. C. Franz; General Manager, W. M. Graves.

THE Cortright Metal Roofing Co., whose main office and factory are at Philadelphia, Pa., have removed their Western office from Kansas City, Mo., to Chicago, Ill., occupying a part of the Exchange Building, No. 134 Van Buren Street.



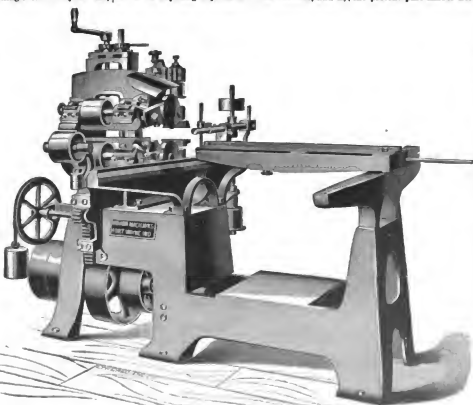
THE NEW WARNER SINGLE TRACK DOOR HANGER.

set true, and the hanger adjusts itself to any unevenness in the track. This hanger is manufactured by the Warner Manufacturing Co., Freeport, Ill.

## A NEW WOODWORKING MACHINE.

The machine shown in the illustration is one of the latest productions of the Indiana Machine Works, Fort Wayne, Ind. It is designed for use in such, door and blind factories, planing mills, job shops, etc. A smaller one is also made for furniture making and is styled the No. 3. The base is cast in one massive piece, has a substantial floor support, and is necessarily much more rigid than were it bolted together. As operators use their hips in connection with their hands in pushing carriage across slides, an opening is left in top of base, so that there is nothing to interfere with his using his side should he see fit to do so. The arbor housing is fitted to planed surface, and is abundantly heavy for every purpose. The arbor frames are fitted on dovetail ways with provisions for wear, their bearings being long and far apart. The arbors are of large diameter, and run in extra long boxes. They carry two steel heads each, that will cut out a tenon seven inches long, and by our patent adjusting device both heads may be adjusted separately together and without altering the space between them. The upper head has an overcut movement, so that a tenon may be made longer on one side than on the other.

The cope heads are made of gun metal, and are accurately balanced. They are fitted to arbor frames, so that when heads are adjusted they go with them. Independent adjustments are furnished for these heads, all of which are easy of access. The cope countershaft is



IMPROVED TENONING MACHINE MADE BY THE INDIANA MACHINE WORKS.





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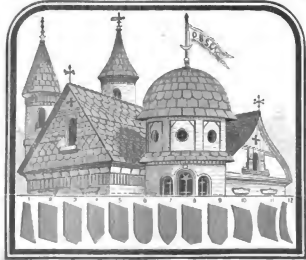
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The Company is also prepared to fill orders for Mill Stock of every description, such as Mantel Sock, Steps, Risers, Hearths, Window Sills, Floor Tiles, and Ridges.

Address correspondence to the Company's office at Bethlehem, Pa.

(Continued from page iv.)

(D) R. M. C. says: The water of my drain will continue until portions of sand. The pump discharges about 100 gallons of water a minute. I can tell you from me to what is the best method to filter the water from sand. I have the cloth bag over the discharge pipe with several screens, so when the sand works its way through, and in addition, a screen bag pressure is given to the pump. An ordinary filter quickly clogs. Possibly you may know of some kind of cloth filter or other method which will prevent the sand. (Sketch an opening of sand to 100 gallons.) I. We can only recommend pumping into a tank large enough to allow the sand to settle by the slow movement of the water across its length. For the quantity that you state a pump a foot in diameter and depth and 5 or 6 feet long, with the water flowing from one end and out at the other, should allow of complete settlement of the sand, which would be occasionally cleaned out. Any filter of ordinary size will soon clog. We suggest also that the drive pipe strainer is too small. It might be paid to put down a new drive pipe with an extra drive strainer.

(E) P. J. H. asks: L. What is an automatic cut-off? A. An automatic cut-off is one controlled by the radius or irregularity in its work, and is made variable by the mechanism of the valve gear. B. What is a variable cut-off? A. A variable cut-off is a regulating valve to make any required cut-off of an ordinary valve by varying the position of the valve gear by means of an adjusting spindle projecting outside of the steam chest. C. A tank of water with a 20 foot head has a one inch pipe 1 foot long secured to the bottom, what is the discharge per second? D. One of my friends is a pipe maker. He says, per second, Another 20 gals. per second. The tank has it at the gals. per second, I respectfully submit my way of working it out. Work 1 foot and 1/2 in. diameter, the square root of 64.33, and the depth of the tank of the opening from the surface of the water, by the area of the opening in square feet, and this product by the coefficient for the opening. The whole product will give the discharge in cubic feet per second. Multiply this by 7.48 for the number of gals. per second. A. The rule to convert, but just figuring is defective. You should use the area of a 1 in. pipe lined. To explain, one, 0.7854, and a coefficient of 0.77. We make the discharge 115 gals. per second.

(F) J. C. A. asks whether more coal will be required to heat a greenhouse 24 feet long, by 12 feet, with the boiler at one end than if it is at the center of the house. A. There would be no difference as to the gross amount of coal required to heat the greenhouse, but it might make a great difference in the uniformity of distribution of the heat. The position of the greenhouse is required in the direction of the cold winds, is a house as long as stated, will make a great difference in reference to the position of the boiler, where, for best effect, should be placed at the end most exposed to cold winds. Otherwise a certain power on the northward side of the roof (see page vii).

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It has 800 per cent. more tensile strength than lime; it is fireproof; will not cleave in case of leakages; saves weeks of time in finishing buildings; does not swell or shrink; does not ruin woodwork by saturating it with moisture; does not obstruct the streets with sand and mortar beds, and, in every way, is superior to all other plastering materials.

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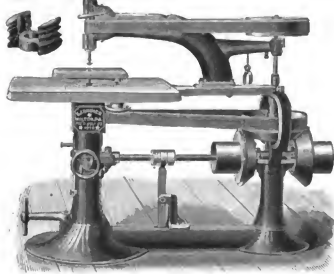


Shimer's Variety Moulder, with  
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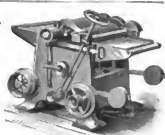


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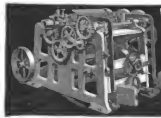
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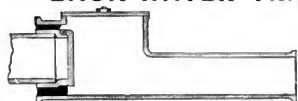
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(Continued from page VIII)

(11) M. E. W. says: I have a range, with a hot water pipe for a bath room. The pipe in the range becomes clogged with scale of lime. What will prevent it, or prevent it forming? A there is no easy way to clean a range pipe of incrustation. A strong solution of caustic soda (3 or 4 pounds of caustic) put into the circulation will often break up the scale; but it will largely settle in the water tank, and can only be cleaned out by taking out the water tank. The plumber should know what is best to do. Frequent use of the caustic soda will keep the pipes clean, but with the necessity of cleaning out the water tank each time.

(12) W. T. says: Can you inform me about what per cent of heat contained in anthracite coal, burned in a stove made for heating only, can be absorbed into a room, or can you tell me what stove is necessarily a loss of 30 per cent or over, under the most favorable conditions? A. The loss of heat in constant stoves may be as great as 30 per cent, but with the best stove, provided with large absorbing and radiating surfaces, the loss should not be greater than 25 per cent, and much of this might be saved by extending the stoves, so as to utilize all the heat, even enough to create draught. Much of the heat is also lost by opening stove doors for a while.

(13) A. M. says: Assuming that the wood is steamed and bent when green, and allowed time for the wood to be thoroughly seasoned and set in the bend, would it be inclined to lose of the shape or curve if exposed to darts? If so, do you know of any process of seasoning the wood damp-proof? A. Best would be to remove its original shape when exposed to damp or moisture wet. The only way to prevent it is to finish and oil or varnish the bent wood, so as to prevent shrinkage in its hygroscopic condition.

(14) D. R. C. says: I wish to paint the brick walls of a composing room, and for setting type, and also the rough brickwork below the roof, with some white substance that will not scale off and fall into the type. Please state in the Scientific American or what composition would be the best for this purpose. Would like something not very expensive. A. We recommend a whitewash made in the proportion of one-half a bucket of best lime slaked in hot water, eight quarts well dissolved in hot water, 2 1/2 lb. zinc metal boiled in a paste to which add one-half a pound white glue previously dissolved and one-half a pound clear whiting. Add the salt brine to the slaked lime and the other ingredients. Keep it hot while using. Use a whitewash brush. Whitewash should be thoroughly cleaned from dust before applying this whitewash. It makes a light surface like paint.

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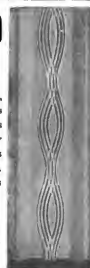
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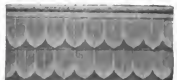
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H. J. French & Co.	10	F. B. Malory	10	John A. Jackson & Bro.	10
<b>Mathematical Instruments.</b>		<b>Sidewalk Lamps.</b>		<b>Well Paper.</b>	
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<b>Memorial Windows.</b>		<b>Shaping, Planing, Hangers.</b>		<b>Well Pliers (Adams).</b>	
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H. J. French & Co.	11	A. Wyckoff & Son	11	The Adams Plaster Co.	11
<b>Oil Well Supplies.</b>		<b>Steel Banding.</b>		The Adams Plaster Co.	11
Oil Well Supply Co.	11	J. H. Taylor & Co.	11	The Adams Plaster Co.	11
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Benjamin Dixon Paint Co.	11	<b>Steel Builders.</b>		The Adams Plaster Co.	11
F. W. Harvey & Co.	11	Robinson & Co.	11	The Adams Plaster Co.	11
H. W. Johnson Mfg. Co.	11	<b>Surveying Instruments.</b>		The Adams Plaster Co.	11
<b>Patents.</b>		L. Manner	11	The Adams Plaster Co.	11
C. J. Smith	11	C. F. Richardson	11	The Adams Plaster Co.	11
<b>Parquet Floors.</b>		<b>Temperature Regulators.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Temperatures.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Tools and Fuel.</b>		The Adams Plaster Co.	11
<b>Photographic Engraving.</b>		<b>Tools and Fuel Machinery.</b>		The Adams Plaster Co.	11
Photo Engraving Co.	11	W. F. A. & Barnes Co.	11	The Adams Plaster Co.	11
<b>Photographic Double.</b>		C. E. Little	11	The Adams Plaster Co.	11
Photo Engraving Co.	11	H. J. Harrison Co.	11	The Adams Plaster Co.	11
<b>Planing Mill Machinery.</b>		<b>Tower Ornaments, Finials, Etc.</b>		The Adams Plaster Co.	11
Planing Mill Co.	11	V. E. Colby	11	The Adams Plaster Co.	11
<b>Planing Mill Machinery.</b>		<b>Trap, Sewer Gas and Backwater.</b>		The Adams Plaster Co.	11
Planing Mill Co.	11	Y. E. Colby	11	The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Internal Trimmer.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	The Planing Co.	11	The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	F. W. Harvey & Co.	11	The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
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H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
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H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
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<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
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<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
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<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
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<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
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<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b>		The Adams Plaster Co.	11
H. J. French & Co.	11	<b>Vertical.</b>		The Adams Plaster Co.	11
<b>Portland Cement.</b>		<b>Vertical.</b> </			



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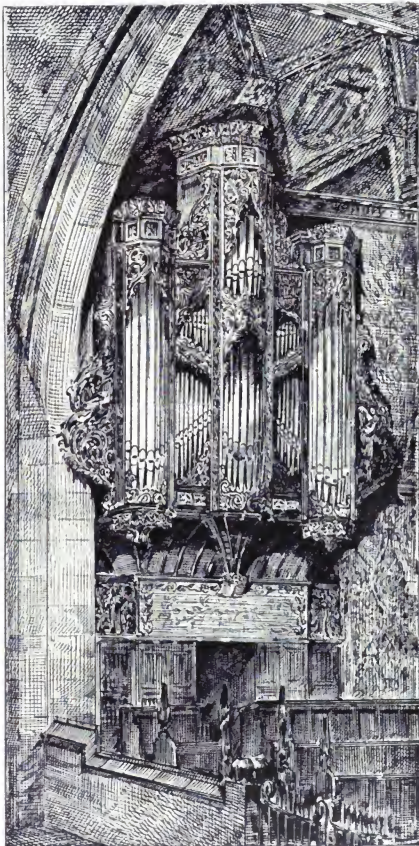
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DESIGN FOR ORGAN, ALL SAINTS', COMPTON, LEEK—BY MR. GERALD C. HORSLEY.

[See page 50.]





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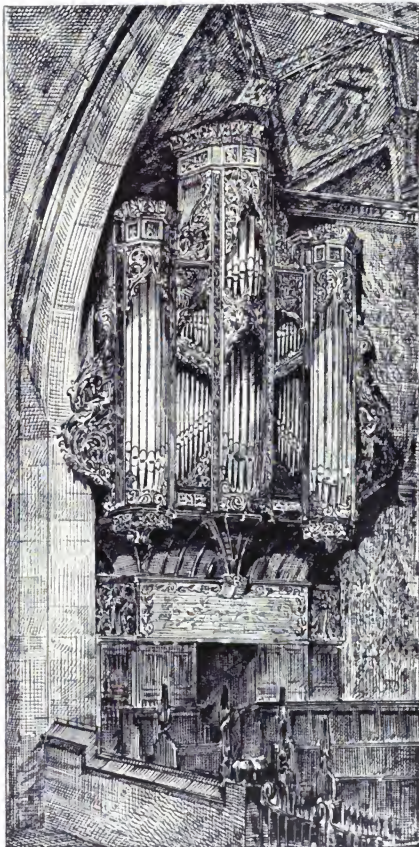
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[See page 50.]

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## CONTENTS

OF THE APRIL NUMBER OF THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN.

(Illustrated articles are marked with an asterisk.)

Chair, metal, Andrews' .....	40	Monument, grand .....	40
Church, brick, Andrews' .....	41	Monument, grave .....	41
Church, brick, Andrews' .....	42	Monument, grave .....	42
Corner of Main and .....	43	Monument, grave .....	43
Corner of Main and .....	44	Monument, grave .....	44
Corner of Main and .....	45	Monument, grave .....	45
Corner of Main and .....	46	Monument, grave .....	46
Corner of Main and .....	47	Monument, grave .....	47
Corner of Main and .....	48	Monument, grave .....	48
Corner of Main and .....	49	Monument, grave .....	49
Corner of Main and .....	50	Monument, grave .....	50
Corner of Main and .....	51	Monument, grave .....	51
Corner of Main and .....	52	Monument, grave .....	52
Corner of Main and .....	53	Monument, grave .....	53
Corner of Main and .....	54	Monument, grave .....	54
Corner of Main and .....	55	Monument, grave .....	55
Corner of Main and .....	56	Monument, grave .....	56
Corner of Main and .....	57	Monument, grave .....	57
Corner of Main and .....	58	Monument, grave .....	58
Corner of Main and .....	59	Monument, grave .....	59
Corner of Main and .....	60	Monument, grave .....	60

## DESIGN FOR AN ORGAN.

A satisfactory finish for a church organ front is one of the most difficult of architectural problems. No object in the edifice is subject to so much exacting criticism. The organ usually stands in the very focus of observation in the auditorium, and any architectural, inartistic parts of its design or finish become an eyecore to the congregation and a cause of discontent. On the other hand, if the organ is "a thing of beauty," it is "a joy forever." A very graceful, harmonious and artistic design for an organ is here presented in an engraving on page 49. It is the design of Mr. Gerald C. Horsley, and was exhibited at the Royal Academy Exhibition in 1891. We are indebted for our illustration to *The Builder*, London.

## A COTTAGE AT RUE ROCHELLE.

One of our colored plates this month illustrates a beautiful cottage, erected for the Manhattan Life Insurance Co., at Rochelle Park, New Rochelle, N. Y. The design is an admirable one; it is in the American style and combines a picturesque exterior and a convenient interior. The piazza, porch, balcony, bay windows and the curb roof are the features of the exterior. The underpinning is built of field stone, laid at random, the exterior above is shingled and weather finished, with all trimmings painted white. Roof shingled. Dimensions: Front, 35 ft.; side, 41 ft. 6 in., not including piazza. Height of ceiling: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. There is a cemented cellar under whole of house that contains furnace and necessary apartments. Hall, trimmed with cherry, contains a staircase of unique design, a piano and a bay window. The hall is lighted in a pleasing manner with stained glass windows. The floors are of hard wood. The other apartments are trimmed with white wood, finished natural. Parlor and dining room have open fireplaces built of brick and furnished with tiled hearths and facings and hand painted mantels with beveled glass mirrors. Butler's pantry is of sufficient size to admit the usual fixtures. Kitchen and laundry are wainscoted and are finished in the best possible manner. Rear stairs lead from kitchen to second floor, and beneath these stairs is a closet. Second floor contains a bedroom with large closets, door and bay window, the latter wainscoted and fitted up with tub, bowl, and closet complete. Two bedrooms on third floor, cost, \$3,300 complete. Mr. G. W. Thompson architect, same place. Our engraving was made direct from an engraving of the building taken specially for the SCIENTIFIC AMERICAN.

## A RESIDENCE AT BERNHART, LONG ISLAND.

In addition to the colored plate of this dwelling, which we give this month, we also present on page 51 an engraving of floor plan. It was built at Bernhart, Long Island, for William H. West, Esq., of the Prince & West Mineral Co. The design is not purely any one style, but is chosen from the various schools, and is an example of what might be called American. The story, except the kitchen part, is built of brick laid in red mortar, with hollow walls to keep out dampness; the remainder being shingled and stained to give it an antique appearance. The high and rather steep roof with the round overhanging turret in the rear, overlooking the bay, the piazzas and bay windows, are the principal features. Dimensions: Front, 50 ft.; side, 44 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior trim is colonial in feeling, and the door and window sashes are carved in elegant manner. The hall and dining room are trimmed with antique oak and each has a paneled wainscoting, five feet in height, and a ribbed ceiling. The staircase in hall is a very handsome one and it is furnished with massive carved newels and a silver candelabra. The hall also contains a fireplace built of Tiffany brick, with hearth laid with tile, and it is provided with wrought iron dogs and trimmings. Dining room is fitted up with a fireplace, furnished with tiled hearth and facings, and a colonial mantel of excellent design and a bay window with seats and a spindle transom. Parlor and library are trimmed with cherry. The former contains a fireplace, with white only tiles and a mantel of exquisite design; the piano window is glazed with stained glass. Library is fitted up with book cases and window seats. Floors of hard wood. Butler's pantry is trimmed with oak and is replete with the usual fixtures. Kitchen, laundry, and bath are trimmed and wainscoted with white pine finished natural. There are three bed rooms and bath room on second floor, besides three servants' bedrooms and bath. The bed room over parlor is handsomely finished in white and gold; the other apartments are trimmed with various kinds of wood. Bath rooms are furnished with tubs, bowls and closets complete. The plumbing is of the best description and is exposed. There is a large billiard room on third floor and four bed rooms. The cemented cellar under whole of house contains furnace, gas machine, and other fixtures. Mr. Stanley N. Covey, architect, New York. Our engravings were made direct from

photographs of the building taken specially for the SCIENTIFIC AMERICAN.

## A COTTAGE ON THE MAINE COAST.

We publish, on page 54, a summer cottage, erected for Mr. G. W. Beiss, on Great Island, near Portland, Me. Dimensions: Front, 43 ft.; side, 27 ft. 6 in., not including front piazza. Height of ceilings: First story, 9 ft.; second, 8 ft. The design is very picturesque, and the plan is excellent. The spacious piazza and balcony are the features of the exterior. The building is erected on brick piles with stone footing. The first story is clapboarded and painted light olive green, with bottle green trimmings, and the second story is shingled and stained sienna. Roof shingled and painted red. The interior throughout is trimmed with white pine, finished natural. All the partitions, furriages, and ceilings are celled with narrow beaded stuff. The floors are laid with yellow pine in narrow widths. The living room, spacious and well lighted, contains an open fireplace, built of brick, with hearth laid with same, and it is provided with a seat wainscoted. The staircase is separated from the living room with posts extending to ceiling, and the space between filled in with spindle work. Dining room, kitchen, and its apartments are fitted up in the best possible manner. Second floor contains four bed rooms and large closets. There is ample room under house for a carriage. Cost, \$4,750, complete. Mr. Andrew Dorrison, architect, Portland, Me. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

## A RESIDENCE AT BRIDGEPORT.

We present on pages 56 and 57 a residence recently erected for Col. Mason, at Sea Side Park, Bridgeport, Conn. The residence as now completed is one of the most picturesque, best appointed and much admired of its class in its vicinity. The underpinning is built of local field stone, faced and finished in a rustic manner; the superstructure above is of wood, clapboarded and painted colonial yellow, with white trimmings. Roof shingled and finished natural. Dimensions: Front 34, side 74, not including porches. Height of ceilings: Cellar, 8 ft.; first story 11, second 10, third 9 ft. 6 in. The main hall and staircase are the special features. The arch in hall is supported on colonial columns with carved capitals. This hall is trimmed with antique oak and it has a paneled wainscoting, an open fireplace with a tiled hearth and mantel, and a bay window with seats and a spindle transom, which is lighted effectively with windows of beaded glass in delicate tints. Toilet is conveniently located under staircase. The parlor is trimmed in an elegant manner with carved casings and cornice, and is finished in ivory white. It contains a fireplace, furnished with tiled hearth and facings, and a carved mantel of exquisite design. The library is a spacious apartment, and it is trimmed with mahogany and provided with book, bay window, and a large open fireplace, with a tiled hearth and facings, wrought iron trimmings and mantel. Dining room is trimmed with antique oak and it has a paneled wainscoting, a ribbed ceiling, and a fireplace with colonial mantel. Butler's pantry is trimmed with similar oak, and is furnished with a bowl and shelf of Italian marble, and dressers fitted up complete. Bath, hall and kitchen are trimmed and wainscoted with ash and are provided with all the necessary fixtures in the best possible manner. The second floor is trimmed with whitewood, treated in color, and it contains five bed rooms and bath room complete. Bath room is wainscoted with white pine, and it contains a tub, bowl and toilet. Floors of hard wood. The third floor contains the servants' apartments, with private staircase. Cemented cellar contains laundry, furnace and apartments. Cost about \$25,000 complete. Francis H. Kimball architect, No. 40 Broadway, New York.

Our colored plate and engraving of photographs of the building taken especially for the SCIENTIFIC AMERICAN.

## A RESIDENCE AT MONTCLAIR, N. J.

We present on pages 59 and 60 two perspective views and floor plan of a residence erected for William Wallace, Esq., at Montclair, N. J., from plans prepared by Munn & Co., architects, New York. The design combines a pleasing exterior and a well arranged interior. The underpinning is built of red sandstone, rock faced and painted in black mortar. The exterior above is shingled with hemlock boards, well nailed to studs, and then covered with paper. The first story is clapboarded with beveled Michigan strip and the second and third stories are covered with cypress shingles—all painted lead color. Roof is also covered with cypress shingles. Dimensions: Front, 35 ft. 10 in.; side, 56 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft. 6 in.; second, 10 ft.; third, 8 ft. Vestibule and main hall are trimmed with quartered oak, and the latter contains a paneled divan and an ornamental staircase of similar wood, with massive carved iron balustrade and handrails, and with stained glass effect. The floor is laid with oak and



A COTTAGE AT NEW ROCHELLE.



FIRST FLOOR.

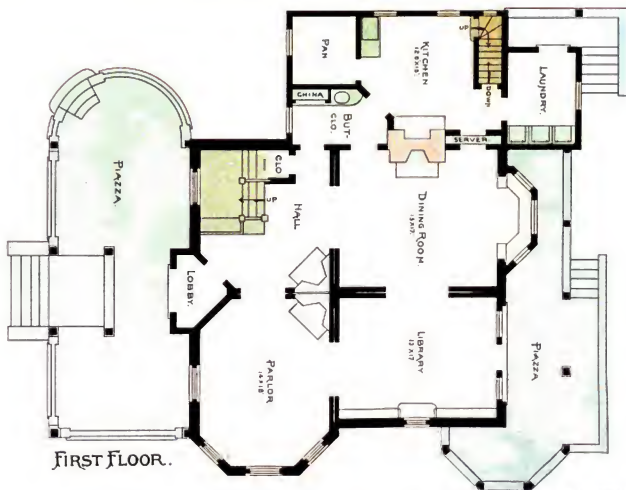


SECOND FLOOR.





A RESIDENCE AT BENSONHURST.





highly polished. Parlor and library are trimmed with cherry, the latter containing open fireplace, built of Trenton pressed brick, with a tiled hearth and a hard wood mantel of excellent design. Parlor has a similar mantel. Dining room is trimmed with dark ash, and it has a floor laid with Georgia pine, with a cherry border. Kitchen and its apartments are wainscoted and trimmed with Georgia pine, and the former is fitted up with wash tub, sink, range, and pantries complete. The second floor is trimmed with white-walnut, finished natural, and it contains four bed rooms, den, and bath room. Bath room is wainscoted and trimmed with cherry, and it has a floor laid with maple and cherry. There are three bed rooms and trunk room on third floor. Cemented cellar contains furnace and other apartments. Cost, \$6,500 complete.

Our engravings were made direct from photographs of the building taken specially for the **SCIENTIFIC AMERICAN**.

#### A MOUNTAIN SIDE RESIDENCE.

Our engravings, pages 51, 52, 53, illustrate a residence erected for W. A. C. Chase, Esq., at Montclair, N. J. The design is excellent. It combines both a pleasing exterior with a spacious plan and a plan showing fine rooms, conveniently arranged. The underpinning is built of red sandstone, rock faced and laid up at random. The exterior framework is sheathed with good hemlock boards, laid on diagonally, covered with paper and then clapboarded, and painted olive gray, with bottle green trimmings. Roof shingled and stained an approved color with Cabot's creosote. Dimensions: Front, 47 ft. 9 in.; side, 32 ft. 10 in., not including front porch and rear piazza. Height of ceiling: Cellar, 7 ft. 6 in.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The vestibule and hall are trimmed with quartered oak, and the latter contains a staircase turned out of similar wood, and a fireplace built of brick and furnished with a tiled hearth, and a mantel of special design. The parlor, library, and dining room are trimmed with white-walnut, finished natural. The doors and windows have heavy moulded casings. The fireplaces in library and dining room have tiled hearths and hard wood mantels. Rear hall, kitchen, and pantries are trimmed and wainscoted with Georgia pine, finished natural, with hard oil, and fitted up in the best possible manner. The second and third floors are trimmed with white-walnut, and the former contains five bed rooms, large closets, and bath. Two bed rooms on third floor. Bath room is trimmed and wainscoted with ash, and it is fitted up replete with exposed plumbing. The floors throughout are maple, and the vestibule and front hall have floor laid with oak. Cemented cellar contains laundry and other necessary apartments. Heated by a furnace. Cost, \$4,500 complete. Munn & Co. architects, New York.

Our engravings were made direct from photographs of the building taken specially for the **SCIENTIFIC AMERICAN**.

#### AN ASHBY PARK OUTCOTTAGE.

Our engraving, page 89, presents a dwelling of low cost, erected for Mr. W. L. Atkinson, at Ashby Park, N. J. Dimensions: Front, 30 ft. 6 in.; side, 43 ft. 6 in., not including piazza. Height of ceiling: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Underpinning built of brick. The building above is framed with heavy timber, and constructed in a workmanlike manner. The exterior is sheathed from foundation to peak, and it is covered with white pine clapboarding, painted pearl gray, with light olive green trimmings. Blinds painted a dull red. Gables are shingled and painted red. Roof covered with colonial red slate. The interior throughout is trimmed with yellow pine, finished natural. The doors and windows have beaded casings and turned angle blocks. The doors are of similar wood laid in narrow widths. Hall contains an ornamental staircase. Parlor and library have hard wood mantels of neat design. Dining room is well lighted, and it is provided with a china closet. Kitchen is wainscoted and fitted

up with pantry and sink replete. The second floor contains four bed rooms, large closets and bath room, the latter wainscoted and furnished complete. One bed room and ample storage on third floor. The house is provided with gas, electric lighting, speaking tubes, and furnace. Cemented cellar under whole of house. Cost, \$3,000 complete. Mr. Bodine architect. Our engraving was made direct from a photograph of the building taken specially for the **SCIENTIFIC AMERICAN**.

#### The Speed of Elevators.

The maximum speed of the fastest passenger elevators which have ever been built, the *New York Journal of Commerce* says, is 1,300 feet a minute, a rate of nine miles in three minutes and a fraction. Before the first in the Western Union building in New York City occurred, that company had a machine which could run 1,500 feet a minute. It was the only one of its kind in the East. Mr. Thomas E. Brown, Jr., a consulting engineer of New York, thinks it possible there are few of equal speed in the West. These machines are of the water balance type—that of the original hydraulic elevator, the invention of Cyrus Baldwin. Owing to its expense, and the fact that it could not be controlled automatically, it went out of use. The speed was regulated by the engineer, and it went fast or slow, as he pleased. With the modern elevator, almost any speed desired can be obtained; it all depends on the power used and the distance traveled. In a build-

ing are gaining favor in private houses. The common elevators of small business buildings are worth at least \$5,000. From that they range up to \$15,000 in the same class of buildings. The American elevators in the Eiffel Tower were costly affairs. They are somewhat similar to those now constructing at Weehawken, but have not the same lifting capacity. The journey to the highest platform, a distance of more than 800 feet, is done by three elevators. The longest run of any of them is 430 feet. Each can carry fifty persons. These elevators are remarkable because they do not go up in a straight line. Starting at an incline of 54°, they run for a distance of 250 feet, then around a vertical curve of 50 feet radius, and then at an incline averaging about 75°. From an elevator point of view, the new Masonic Temple building in Chicago will be the most important in the world. It will have twenty-four cars built in a circular shaft having a 250 foot diameter. There will be express elevators, way and freight trains. The first will go to the top floor without stopping, while the others will stop either at every floor, or at the fifth, tenth, fifteenth, and so on. They will not run at full speed, probably because passengers do not like the sensation of flying. With the present machinery it is just as safe to run fast as it is to run slow. Accidents are few, and invariably due to negligence on the part of the elevator attendants or the passengers. When accidents do happen, it is usually a case of the car catching persons as they are about to enter. The passengers frequently try to board the car after it starts, with the result that, if caught by the elevator between the car and the floor or ceiling, they are killed in nine out of ten cases.

#### The Secret of a Good Memory.

Whatever may be said in regard to the training of memory, it must be remembered that memory is not, as used to be supposed, an independent faculty of the mind that in some mysterious way may be directly strengthened by exercise, as a blacksmith strengthens his arm; but that memory is retentive is due to the plasticity of nerve centers, and the property of nerve centers by which they retain in growth their functional modifications; and that recollection depends upon physiological conditions such as the cerebral circulation and the proper functioning of nerve cells; moreover, that a complete act of recollection is a complex process involving comparison, inference, and the like. Hence, whatever in general is conducive to vigorous health, and whatever tends to habits of clear and orderly thinking—such conditions will aid recollection. And whatever is detrimental to the normal functioning of the nerve cells—fatigue, intense emotion or the like—and whatever blinds the judgment with smaller gratification, in short, all psychological hindrances are enemies of him who has good health, sane emotions, and trained power of attention. But no amount of study, nor all the prescriptions of unseasonable doctors, from Simonides to Loebnitz (except so far as they train attention), can atone for an amount of habit and lack of power of attention.—Prof. W. H. Burnham, in *Scientific American*.

## PATENTS.

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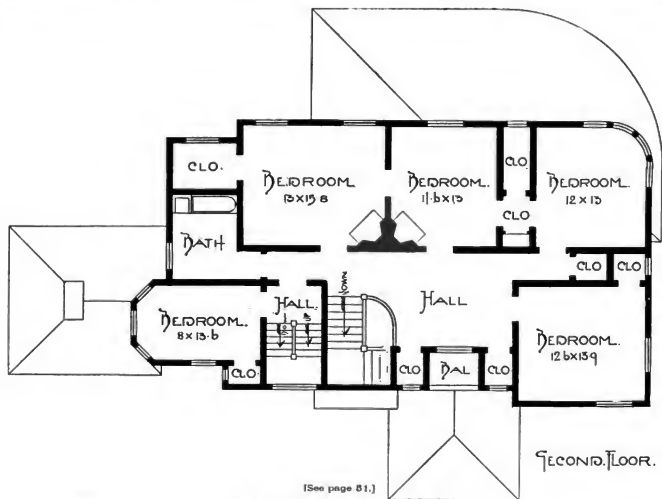
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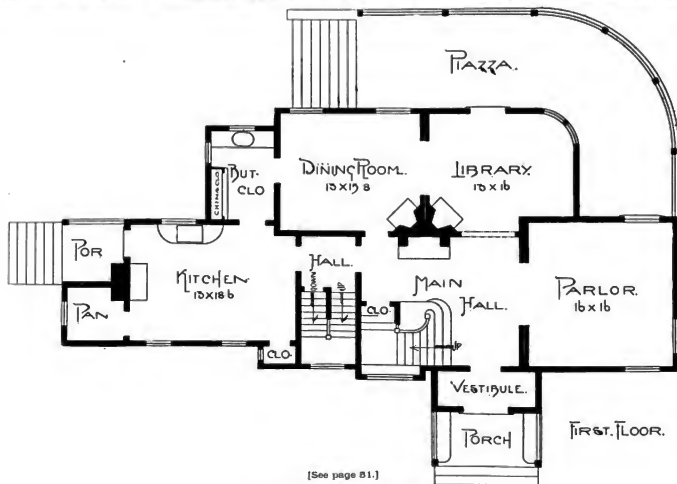


A MOUNTAIN SIDE RESIDENCE—INTERIOR.

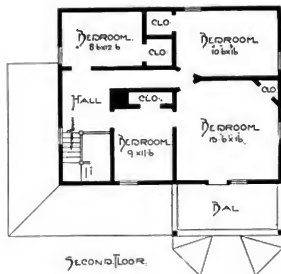
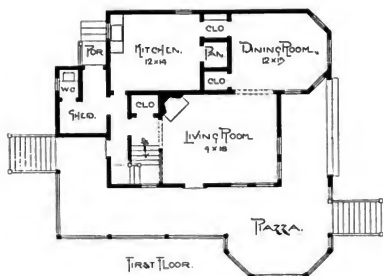
ing which has a shaft of 250 feet, a speed of from 850 to 1,000 feet a minute can be attained. On a rise of 150 feet it is easy to get a speed of 750 feet per minute with a weight of 1,000 pounds aboard the elevator. In New York the fastest elevators are in the Union Trust Company's building on Broadway, near Wall Street. They shoot up or down, carrying 3,000 pounds, at a speed of 600 feet a minute. When tested with lighter weights, they have traveled from 500 to 600 feet in a minute. But the average speed of elevators in New York is 300 feet a minute. It is best adapted for work, and experience has demonstrated that more passengers can be carried daily in a car going at that speed in the ordinary large building than any other. The increase in the size of elevators is in keeping with improvement in other directions. The largest passenger cars in the world are now in course of construction at Weehawken. These elevators, of which there are three, are designed to carry 135 persons on each trip and are equivalent to ten tons. They will be owned by the North Hudson County Railway Company. A viaduct 975 feet in length has been built out from the Palisades to a point above the ferry depot. From the rails on the viaduct to the river level the distance is 150 feet. An elevator shaft of that extent is now building, and passengers who cross the ferry will be transferred to the elevators and thence to the trains instead of ascending to the Palisades by the inclined railway, as heretofore. The railroad company's contract calls for a speed of 300 feet a minute, but, as a matter of fact, the cars will be capable of going much faster. Each elevator will be worked by 200 horse power. The entire plant will cost \$34,000. Elevators



A MOUNTAIN SIDE RESIDENCE.



A MOUNTAIN SIDE RESIDENCE.



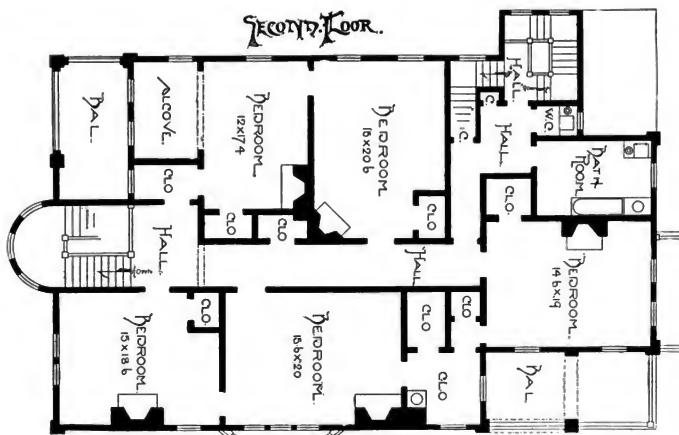
[See page 50.]

A COTTAGE ON THE MAINE COAST.



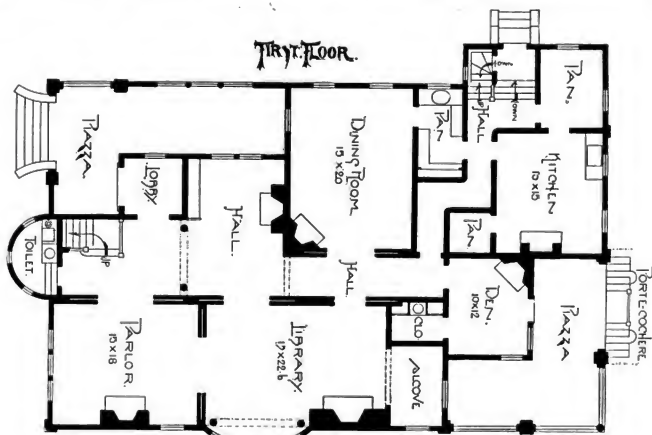
A RESIDENCE AT BENSONHURST. [See page 80.]





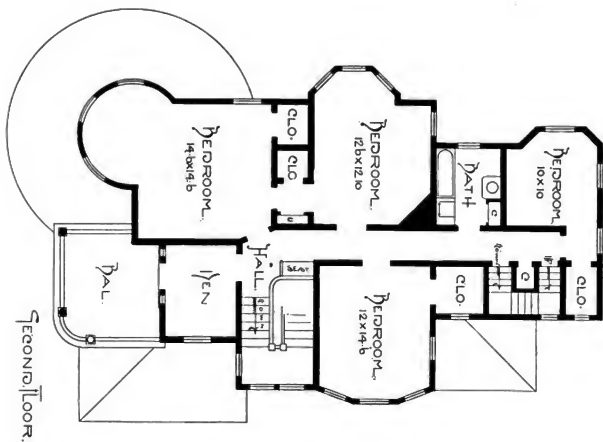
[See page 80.]

A RESIDENCE AT BRIDGEPORT, CONN.



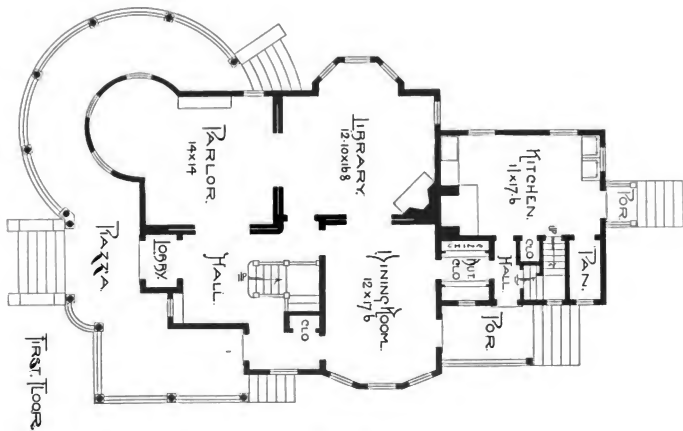
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A RESIDENCE AT BRIDGEPORT, CONN.



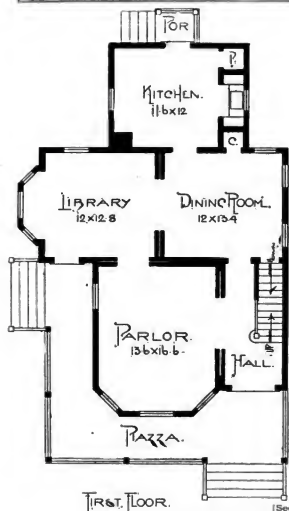
[See page 80.]

A RESIDENCE AT MONTCLAIR.



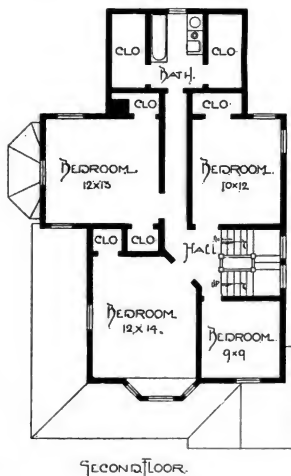
[See page 80.]

A RESIDENCE AT MONTCLAIR.



[See page 81.]

AN ASBURY PARK COTTAGE.





## A CEMETERY CHAPEL OF MODERATE COST.

We find in the *Illustrated Carpenter and Builder*, of London, the accompanying sketch, in which the author has endeavored to design something picturesque and suited to the nature of the surroundings, but at the same time capable of being constructed of the simplest materials, so as to keep down the cost. No dressed stonework would be required, it being suggested that the walls should be built of local rubble with large squared stones at angles, windows, etc. The window frames could be either wood or iron. Should no bell be required, the turret on ridge might be omitted.

## RICHMOND HILL CONGREGATIONAL CHURCH AND PARSONAGE, BOURNEMOUTH.

The site might almost be described as approaching the architectural ideal for its purpose, possessing the rare advantage of being central without being too public, and occupying a raised position, which is, at the same time, easily accessible, and it contains many advantages attaching to the question of position in a marked degree. The main objects to be attained by the plan were first the accommodation of a large congregation in a compact form, the necessary connection with the existing school and class rooms to the north of the building, and the provision for further school buildings and lecture hall accommodation adjoining. As will be seen by the plans, these essentials are met by the main corridor at the rear communicating at once with the old class rooms and leading to those it is proposed to add at the northeast of the block, this corridor being also in connection with the staircases leading to the lecture halls above and the children's galleries in the transepts, as well as to the lobbies from the vestry to the church on the ground floor. The church proper in this case naturally assumes a somewhat

cruciform plan, without any endeavors on the part of the architects toward ecclesiastical precedents; on the other hand, as their principal efforts have been directed to the comfort of the congregation, they have avoided as much as possible any arrangement by which columns would intercept the view of the congregation.

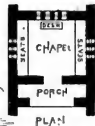
immediately adjoins, the organist and his choir are in perfect touch with each other. The tower is placed at the southwest angle, forming on the ground floor the principal porch and entrance to the building. In the nave and transepts on the ground floor the building is arranged to accommodate about 900 people, this number being increased to about 1,100 by the sittings provided in end and transept galleries. The building is designed throughout in the spirit of a somewhat late period of Gothic, the materials being principally Swanage stone walling, with Bath or Portland stone dressings, and most of the old materials that are found will be incorporated in the new structure. It is proposed to warm the whole building on the hot water circulating system, supplemented by one of warm air to be used when necessary. Fireplaces are, however, provided in most of the class rooms in addition. The ventilation is effected by two extract shafts on each side of the roof, communicating in the one case with the fleeth, and the other with the tower, both being provided with a gas cone to promote a proper current and prevent down draught. The estimated cost is between \$30,000 and \$35,000, the plans of the architects, Messrs. Lawson & Dunkin, of Bournemouth, having been selected in a local competition.—*The Building News.*

Plastering Composition,  
Arthur L. Grant, of Toronto, Canada, has lately patented a plastering composition, of which the following is a specification:

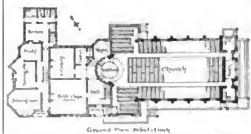
"I take about 90 pounds of cotton seed oil, and after heating it to about 120° Fahrenheit I add thereto about 45 pounds of caustic soda lye of 36° Baume. I stir this mixture and allow it to stand undisturbed for one or two hours or more. I then heat the mixture again to boiling point, adding, by degrees, about 30

## A CEMETERY CHAPEL OF MODERATE COST.

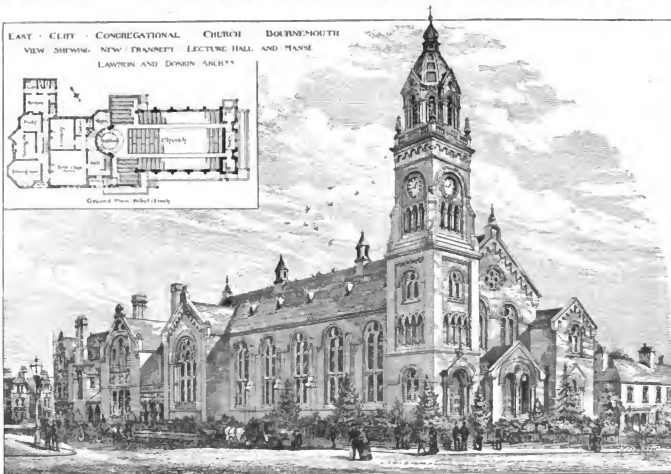
gation, and have therefore made the aisles assume the functions of simple gangways, except at a time of emergency, when the space might be made available for extra chair accommodation. The floor is raised toward the south, and the seats arranged in circular form, so that all occupants may more conveniently face the pulpit. The apse is entirely appropriated to the use of the choir, and as the organ chamber im-

EAST - CLIFF - CONGREGATIONAL CHURCH BOURNEMOUTH  
VIEW SHOWN: NEW TRANSEPT LECTURE HALL AND MANSE

LAWSON AND DUNKIN ARCHTS



Ground Plan, 1891-1892



RICHMOND HILL CONGREGATIONAL CHURCH AND PARSONAGE

pounds of water, and continue the boiling for two or three hours. I finally add sufficient salt to separate the crude sodium oleate from the water, and run the water off, by means of a tap or otherwise, from the supernatant sodium oleate. This oleate I dissolve under heat in the proportion of about 4 pounds of oleate to about 4 pounds of water, and to this solution I add about 12 pounds of water and 25 pounds of a dry pulverized absorbent—for instance, clay or talc. This mixture is dried and pulverized and forms the preliminary compound. It is desirable that the absorbent should contain no free acids or any soluble salt of lime. This dry compound is now ready for use. When this compound is mixed with plastering materials for walls, ceilings, etc., containing lime in any form—for instance, sulphate of lime, carbonate of lime, or hydrated lime—it renders such plastering material non-absorbent and impervious to water and gases, and such walls and ceilings can be papered, painted, or otherwise treated without the usual sizing or preparation. It also reduces the action of the material laid upon the wall or ceiling and permits the

In using this compound in plastering material which contains plaster of Paris or lime, I use about 80 pounds of the dry compound to 700 pounds of plaster of Paris, or from 50 to 100 pounds of lime. For lime water or cements I use from 10 to 40 pounds of the dry compound to 100 pounds of lime or cement in the mixture.

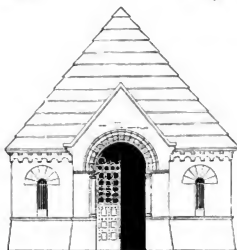
of the above two ways, they may be dissolved in water and applied to the lime mortars, cements, or concretes in the proper proportion when required for use."

#### DESIGN FOR A FAMILY BURIAL VAULT.

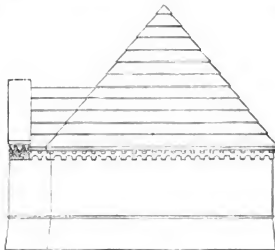
We present a design for a family burial vault, for which we are indebted to Stone.

It is the second prize design in the competition No. 3 of Stone, Cincinnati Architectural Club. It is an appropriate design, well suited for the intended purpose.

THE desire for fitness and beauty in architecture is, perhaps, much more common among even the rudest of the population than is generally imagined; and the pleasure which a beautiful and proportionate building may give to millions of people, even though they see it but for a few moments as they hurry to and fro, is a pleasure not to be despised; and, moreover, it is a great, though silent, means of education. The greatest critics (such, for instance, as Lessing) have laid down the rule that, if possible, nothing in art that is disproportionate or informed or badly colored should be brought before



Front Elevation



Side Elevation



Plan

Design for Family Vault  
(An Artist Club competition  
submitted by REST)

Scale for Elevations  
3/16" = 1 ft  
Scale for Plan  
1/4" = 1 ft

#### DESIGN FOR A FAMILY CEMETERY VAULT.

next coat or layer to be placed on the same with greater ease. This plastering composition can be used both for outside and inside plastering or upon damp walls, and forms, practically, a water-proof surface. The admixture of this compound to lime mortar, cement, and concretes composed wholly or in part of carbonate or sulphate of lime or hydrated lime renders the mixture capable of resisting the action of water,

"Instead of preparing a preliminary dry compound containing the oleate, as above described, the oleate can be dried by itself in a water bath or otherwise at a temperature below 225° Fahrenheit, and then be pulverized or comminuted. This dry comminuted oleate can be added directly to the plaster, mortar, cement or concrete when required for use."

"Instead of using the oleates or palmitates in either

the eyes of the young. They even object to caricature on this ground. To adopt such a proportion in all its bearings may be impractical, may be almost impossible. But certainly the converse holds good, namely, that to bring before the eyes of the young and the uneducated beautiful and well-proportioned objects of art is a means of education, the indirect effects of which it is difficult to overestimate.

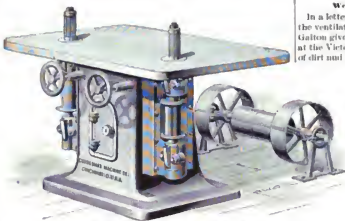
## A VERTICAL DOUBLE SPINDLE SHAPING MACHINE.

The machine shown is extra heavy, for straight and irregular forms, and is especially suited for coarsening, architectural and railroad work, where a good, substantial machine is wanted to stand up to the very heaviest work. The column is heavy, and the metal well distributed. It is eared out and cast in one large piece. The spindles, which are long, stiff, accurately turned and truly ground, are made of  $1\frac{1}{2}$  inch steel, measure  $1\frac{1}{2}$  inches in diameter above the table, and placed 30 inches apart from center to center. They can be adjusted vertically by means of screws on inside of column, which are operated by the hand wheels in front of the machine. The iron table, which measures  $4 \times 4\frac{1}{2}$  feet, is amply large for any kind of work. It is well braced, planed perfectly true, and fitted with concentric rings to suit various sizes and kinds of heads and cutters. The tight and knurled pulleys on countershaft are  $18 \times 6\frac{1}{2}$  inches face, and should make 600 revolutions per minute. For further particulars of this machine address the Cordesman Machine Co., 24 to 34 Butler Street, Cincinnati, O., U. S. A.

## Shadow as Element of Design.

Beauty of profile must succumb in this country from its highest place and be content to wign in conjunction with shadow, if not to be subservient to it and it was the perception of this necessity which forms one of the great charms of Gothic and Norman architecture, and was the under idea of Sir C. Wren, as evinced in the detail, the ornament and the massing of his buildings. For shadow is so indispensable to the development of perfect character in a building that, when nature is not favorable to its production, all that human art can do should be done to obtain it. That the necessity for shadow is not, however, the same in all classes of buildings may well be supposed. For instance, the grander or stronger the character to be expressed, the less need there is of it. We may see this as regards grandeur in the Pyramids in the wall of the Forum of Nerva and the walls of fortified towns, and, as regards strength, in the Pitti Palace, Florence, and the generality of Tuscan palaces—the Palazzo Thiene, Vienna; the Palazzo Farnese (north), and most of the Roman palaces. In all these the simplicity of the form being essential to their effect, it follows that the shadows should possess the same character, and any complicate or broken shadow given them would be wrong, because not consonant with the nature of the containing forms. The most remarkable union of strength and shadow perhaps to be seen is St. Paul's, Current Garden. But for the full development of a more truly beautiful character we may turn to the temples and monuments of ancient Greece and Rome, where shadow is carefully studied, and expresses the beauty of the various forms, as in the fronts of the Parthenon, Pantheon, the triumphal arches, the Colosseum, and in modern works in the Basilica, Vienna; the logic of the Vatican; the Palazzo Reale, Verona; the Lions' Court of the Alhambra; the Library of St. Mark, Venice; and Whitehall. There can evidently be no rule for the quantity of shadow appropriate to so many different grades of the beautiful in architecture, but we may be pretty sure from these excellent examples that the shadow should be of a medium power, not superior in the form, and consequently that all projections and recessions in massing or ornament should be of a medium character also, obtaining neither the largeness of the grand nor the brokenness and depth of the picturesque. Whatever style of architecture we adopt, it is not sensible to make use of those

exact forms of mass or detail which were intended for an entirely different climate and for an effect which we in England can seldom, if ever, hope to obtain. But the shadow which nature has denied us may still be gained by the effective, because sensible, practice of northern art—by deeply cut mouldings, great recession of apertures or great projection, if the nature of the wall does not admit of the former, and ornament thoroughly pierced. All will hold shadow in themselves strong and expressive, though no sun should touch them, and doubly charming when so relieved. But in designing it should be remembered that parts which hold shadow in themselves, such as moulding, ornament, etc.,



THE CORDESMAN MACHINE CO.'S SHAPING MACHINE.

should not be confounded with those which shadow another part, as in eaves, angles, walls and detached columns. These do not hold darkness to nearly the same degree, and this degree is weakened as they extend or project. There is no case where the extra and needless expense of detached columns is more seen than in the School of San Marco, Venice, facing the north.—*The Architect.*

## ARTIFICIAL BUILDING STONE.

The accompanying illustrations represent some of the most popular styles of blocks of artificial building stone prepared by E. L. Martin, of No. 628 N. Main Street, Desatur, Ill. The kinds shown are usually kept in stock, in sizes  $8 \times 14$ ,  $10 \times 14$ ,  $10 \times 24$ , and others, and from four to eight inches thick, so that a bill of stone can be furnished to architects and builders within a few days after the order is given. Window sills and ashlar stone and ornamental belt are always kept on hand.

Mr. Martin has had many years' experience in this line of business, and in the making of cement walks.

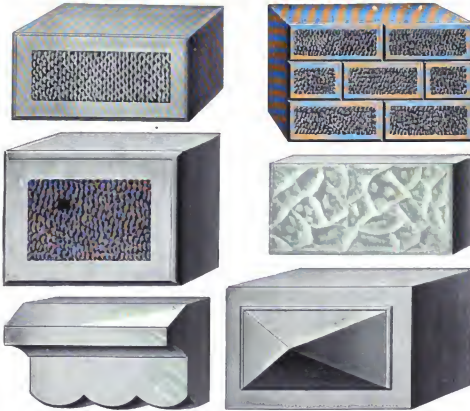
His fine office building in Desatur is an example of a handsome structure made entirely of artificial stone, and he recently erected an entire row of ornamental stone for a building of the Mueller Mfg. Co. Mr. Martin's success in making the best sidewalk known, of artificial stone, has been something phenomenal, and he has obtained such a reputation in this branch that many go to him for instruction, for which he charges a special fee. His efforts have always been directed to making the best possible article, a stone that does not shuck off or crumble, and which frost will not affect, and a sidewalk that will be unequalled in durability and always retain its smoothness of finish.

## Wet Screens for Ventilating Doses.

In a letter in the *Times* of January 30, in regard to the ventilation of the House of Commons, Sir Douglas Galtion gives a description of the "wet screen" in use at the Victoria Infirmary at Glasgow for the removal of dirt and fog from the air previously to its entering a building. He gives the following description of the process: "In this infirmary the air is renewed six times an hour. The volume of air before it enters the wards is filtered and washed by being passed through an air-washing screen of cords, formed of horse hair and hemp, closely wound over a top rail of wood and under the bottom rail, forming a slow screen, sixteen feet long by twelve feet high, affording nearly 200 square feet of surface. There is a constant trickling of water down this screen, by which it is kept wet, and the air, in filtering through it, has the dust and soot particles removed, and when once these have adhered to the wetted surface, a current of air of considerable velocity will not carry them through the screen, but the falling water floats them down into the drain. An average flushing of the air is effected in this way twenty gallons of water is instantaneously discharged over the surface of the screen every hour, to flush and remove any accumulation of wetted dust, soot, or germs which may not be removed from the screen by the trickling water over its surface." Sir Douglas Galtion records the method as one which, among other advantages, will keep fog from entering into the ventilating chambers and hence into the building, and states that on very foggy days the air within the infirmary was perfectly clear and pure.—*The Builder.*

## Irrigation in Nevada.

According to Census Bulletin No. 163, there are 1,167 farms in Nevada that are irrigated out of a total number of 1,311. The total area of the land upon which crops were raised by irrigation in the census year ending May 31, 1900, was 224,493 acres, in addition to which there were approximately 280,000 acres irrigated for grazing purposes. The average size of the irrigated farms, or, more strictly, of irrigated portions of farms on which crops were raised, is 192 acres. The average first cost of water right is \$7.36 per acre, and the average cost of preparing the soil for cultivation, including the purchase price of the land, is \$12.82 per acre. The average present value of the irrigated land of the State, including buildings, etc., is reported as \$41 per acre, showing an apparent profit, less cost of buildings, of \$21.00 per acre. The average annual cost of water is \$0.34 per acre, which, deducted from the average annual value of products per acre, leaves an average annual return of \$12.06 per acre.



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## THE ANDREWS METAL CHAIR.

The chair shown in the accompanying illustration is made of steel twisted together by special machinery invented for the purpose. The style shown has a plain veneer seat, but the seats are also made of quartered oak or mahogany, and upholstered in plush or leather, while the frames are enameled in any color, and are also made in antique copper and brass finish. The chair is designed to make an attractive, durable and highly useful piece of furniture for a drawing room, reception room, or dining room, while also especially



THE ANDREWS METAL CHAIR.

adapted for use on the lawn or veranda, and for halls and other public buildings. It is manufactured by Messrs. A. H. Andrews & Co., Nos. 215 to 221 Wabash Avenue, Chicago.

## A PLUMBER'S BLAST FURNACE.

In 1878, the Haines, Jones & Cadbury Co.'s blast furnace was put upon the market. Since that time 25,000 furnaces have been sold. Improvements have been added from time to time until it has been brought to its present perfection. The furnace may be briefly described as follows: The reservoir, which holds about one gallon of gasoline, is made of 1-XXXX tin, with malleable iron bottom ring and galvanized cast iron top plate. This top plate is tapered for three uprights to support the solder pot; for a filling screw; for a feed pipe, through which the gasoline is conducted through a coil to the burner; and for a small cock through which air is forced into the reservoir by means of a rubber inflator. On top of the three supports is a malleable iron ring, upon which is placed the shield for holding the solder pot. Suspended from this ring is an iron cup which incases a wrought iron coil through which the gasoline is forced by air pressure to the burner connected at bottom of coil.

The furnace is used as follows: It is filled about half full of gasoline. The valve controlling feed pipe to coil is then closed, and the reservoir is charged with air; upon opening valve the gasoline is forced up until it has been brought to the coil and lighted at burner. The flame, confined by the cup, burns up around the coil, heating the gasoline within the coil and forming it into vapor, which forms a constant flame upon emerging at burner. Its intensity can be regulated at will by shutting or opening the needle valve. The cup around coil and burner catches any gasoline which may through carelessness of the operator be forced through before igniting the match, and also assists materially in confining the flame, and creating an upward draught about the coil, there being holes punched in the cup for admission of air. The solder pot is placed within a sheet iron reverberatory shield, so made that it will throw the heat upon the pot to the greatest possible advantage. The furnace will melt ten pounds of solder in six minutes, at a merely nominal expense, and gives out no smoke nor smell. It weighs but seven pounds, so can readily be carried in connection with the outfit of a plumber or tinsmith.



The shield can be of any size or shape, and there is an increasing demand for the furnace supplied with an oblong solder pot to be used by electric linemen for soldering together the ends of wire; which can be done by simply springing the wire into the pot, thereby saving much time and labor over the old way of pouring the melted solder on the joint. As the furnace is now in its operation, and not affected by draughts, it can be used out of doors as readily as within a building. This fact, coupled with the many other advantages, has justly earned for it its present popularity.

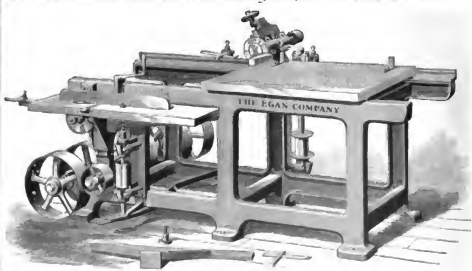
The manufacturers are Haines, Jones & Cadbury Co., of Philadelphia, Pa.

THE HOYT & BROTHER COMPANY, of Aurora, Ill., manufacturers of machinery for working wood, is the style of the recently reorganized manufacturing company started in Aurora in 1871. Owing to the death of Hon. C. L. Hoyt, and the contemplated retirement of L. P. Hoyt from active connection with the business, it became necessary to reorganize the company. The company is an evolution out of the old firm of the R. L. Carter Company, which succeeded the firm of Carter & Pinney, which firm was in turn succeeded by the Hoyt & Brother Mfg. Co., at which time Willis Hoyt identified himself with the concern as secretary and treasurer. They introduced the first successful double cylinder chain feed surfacer ever placed on the market. Following this successful venture came the gradual production of this class of machinery until twenty-three sizes of planers and matchers and eleven different and standard kinds of surfacers and other wood-cutting machinery were manufactured by this firm. This production was increased from year to year until at the present time the illustrated catalogue of the firm represents over 200 different sizes and patterns of wood-cutting machinery, all built in the highest style of mechanical art by skilled experts who have spent many years in acquiring proficiency in this class of work. Hon. C. L. Hoyt, who was at the head of the concern for so many years, is succeeded by his son, Mr. Willis Hoyt, the new president, who has the advantage of long association with his father in the conduct of the business.

## AN IMPROVED WOOD WORKING MACHINE.

The machine shown in this illustration is designed for bushing the edges of sash, and grooving, heading and jointing the edges of blinds, grooving and boring sash for the cords, and the endless variety finishing work of this kind in sash, door and blind factories. It is adapted to do the same amount of work that heretofore required three machines. The top of the frame receives a sliding table working in planed ways for working sash. A stationary table is also furnished for working blinds, when the three cutter heads are brought into operation at once.

The bed is also adjustable on the frame and is provided with saw mandrel for cutting all kinds of grooves, and a boring mandrel, operated by a treadle, for boring the hole for the cord in the sash, which is then passed to the grooving saw, completing the job at one operation, without taking the sash from the table.



SASH AND BLIND, JOINTING, BARRETTING AND FINISHING MACHINE.

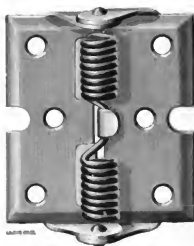
For further information address the builders, The Egan Company, 300 to 320 West Front Street, Cincinnati, O., U. S. A.

THE TIFFANY GLASS AND DECORATING COMPANY is the style of a new firm which has recently acquired the Tiffany Glass Company. The work of the company covers a high class of house and church decorations and memorial work. In the house decorations the following lines are specialties in which original work is furnished: Frescoes, textile fabrics, hangings,

embroideries, upholstery, furniture, mosaics, colored glass, gas fixtures, electroliers, metal work, etc. The directors of the new company are: Louis C. Tiffany, C. T. Cook, Henry W. De Forest, George Holmes, Pringle Mitchell, John C. Platt, John Du Fals, Von Reck Canfield. The address of the new company is 335 to 341 Fourth Avenue, New York.

## THE STEARNS HINGE.

The spring shown in the cut has three parts only, the two leaves and the spring, each leaf being one solid piece of wrought steel, and the spring being held by lips formed up from the leaves. The spring action is designed to hold the door stronger at the closing point, reducing the strain on the spring while increasing

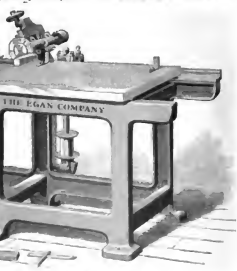


THE STEARNS STEEL SPRING HINGE.

ing its efficiency and durability. Each pair is separately packed in a neat pasteboard box. This spring is made by Messrs. E. C. Stearns & Co., Syracuse, N. Y.

"SELECT MODERN BUILDINGS" is the title of a new little picture book containing representations of a number of recent notable structures in New York and Brooklyn. It is issued by Messrs. Tuck Brothers, New York, manufacturers of mortar colors, and the statement is made that in every one of these handsome and high cost buildings the Tuck "Edinburgh" mortar colors have been used.

THE CINCINNATI CORRUGATING CO. issue a very neat catalogue of their productions, including corrugated roofing, siding, ceiling, arches, bath, shutters, doors, etc. Verrill iron roofing, standing seam plain roofing, roll and cap steel roofing, metallic weather boards, etc. This firm have recently established a rolling mill, galvanizing works, tin plate works and factory at Piqua, O. The manufacture of roofing tin



plates at the Piqua factory is announced as an addition to the heretofore extensive business of the firm.

THE CAMBRIDGE ROOFING CO., of Cambridge, O., and Chatterbox, Tenn., have issued a new catalogue, set up in a way which indicates that business is prosperous with the company. The last cover page gives a view of their factory plant at their new works at the South, as well as their older factory in Ohio. The company make steel, iron, and tin roofing, with corrugated siding, ceiling, doors, and shutters, etc.



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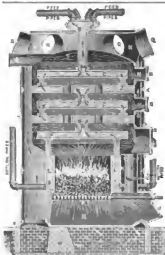
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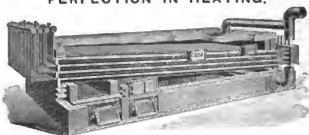
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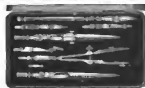
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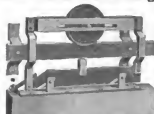
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And for Everything, Either in Brass, Iron or Wood, for  
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Steel Parlor Door HangerHanging on a Single Iron Track, combining esthetic simplicity with durability. Good for City or Suburban. MANUFACTURED BY  
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## Notes and Queries.

(1) D. H. says: I am about to build a track from any dam in my mill, a distance of about half a mile; the track is to be of wood, and will be about one foot under ground. Can you give me any information as to a method to preserve this track? The wood being underneath, and dried with water all the time, will naturally decay, and I thought you might be able to tell me some way to prevent this rapid decay in a certain extent. I know you are authority on all such matters, and if you will tell me where I can find something that will give me information in case needed, or if you can help me, it will oblige me greatly. I intended to state that the track will be built of hemlock. As the long to the track is built with water, there will be fast decay. If water were poured in the track and kept filled with water are very dangerous, and if you will tell me where I can find something that will give me information in case needed, or if you can help me, it will oblige me greatly.

(2) E. C. A. writes: In our saw mill we are running a 14 inch circular saw at 700 revolutions per minute and another 24 inch saw at 1,200 revolutions per minute, which runs at a right angle with the big saw. The smaller saw is placed about 10 feet from the large one and about 8 feet on one side, and runs in the same direction. It has a ring of iron bars from the center raising all around the saw, and when it reaches everything in the mill can be seen by looking through this ring of light or plate as looking through common window glass, and everything looks just as natural except the large circular saw, which appears to be revolving slowly backward, so slow that every tooth in the saw can be seen as plain as when standing still. When stopping the mill, the large saw appears to stop long before it really does. What is the cause of this strange illusion? A. The effect described is similar to that produced in the sculpture of sculpture. It is the illusion of motion. The rate of rotation of the small saw is rapid in that of the large one in such a way as to prevent seeing the teeth of the large saw only when the teeth were in certain position, thus causing them to appear nearly stationary. The illusion is not varied through instantaneous photographic action would appear stationary. If viewed through a slower speed and closed only during each revolution of the saw, the eye would receive a succession of images which would be retained by the persistence of vision and thus blended into one continuous image. The small saw acted as a shutter in producing the effect. It is not necessary that the shutter should be limited to one revolution per revolution of the saw. There may be a number of exposures, but to make the saw appear stationary, the shutter should be no longer part of the number of teeth in the saw.

(3) C. S. A. writes: What kind of a wash can I use to remove tobacco stains from new pine doors? I have just finished a new door and the tobacco has left tobacco stains upon the floor, which

(Continued on page 14)

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Masons' and Builders' Supplies.

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Strictly Pure Lead and Colors, Dry, in Oil, Japan, and ready mixed for use.  
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Are superior to any Varnishes or Wood-Finishes in the market, for the following reasons, viz.:

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Requiring great durability, use No. 2 ELASTIC FINISH.

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A non-conductor, therefore cool in summer.

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The best, cheapest and lightest tile in the world.

No expansion. Noths go on due for themselves. They are the most beautiful and durable roofs in the country.

They lie back on the others. As they are laid at one-fourth pitch and give water to drains. This company owns the patents in all the States east of Mississippi river.

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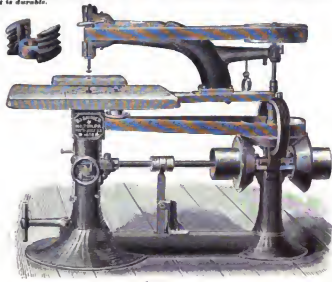


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Price, No. 1, same as No. 1, without Drill, \$60.  
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For moulding or shaping edges of work. Has iron frame, steel spindle and shafts, handwood table, powerful treadle motion, adjustable spindle, machine cut gears, chain belt, etc. Weight, 125 lbs.; boxed, \$35.00.

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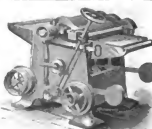
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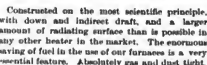
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CLASSIFIED ADVERTISEMENTS—Continued from page xv

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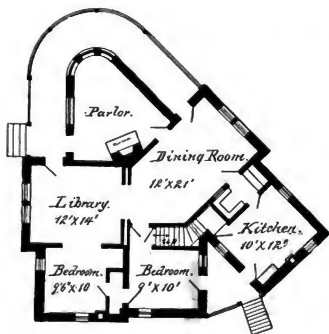
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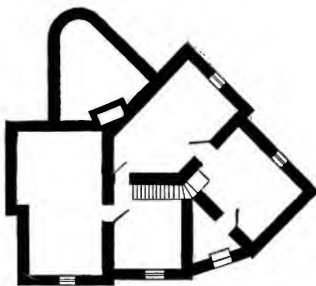
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*Floor Plan.*



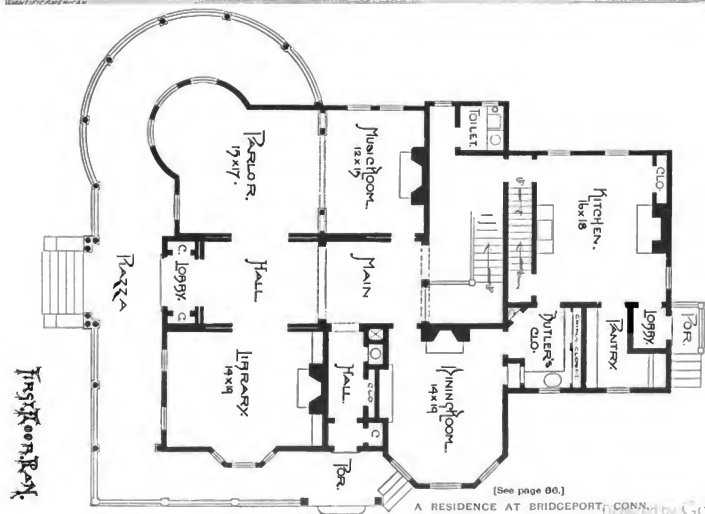
*Basement Plan.*

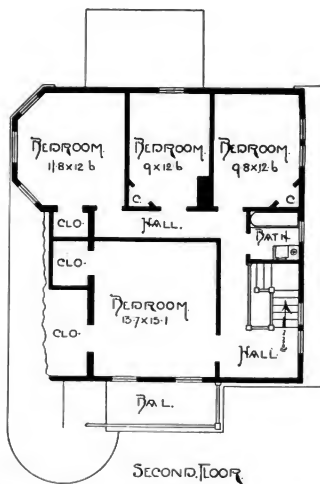
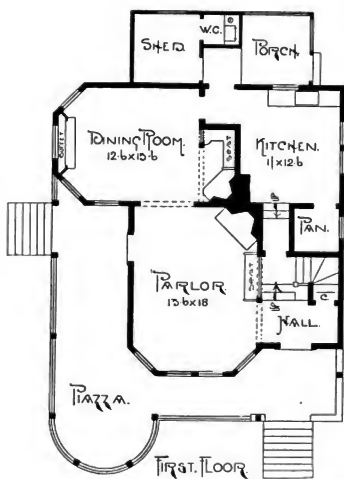
A ONE STORY BRICK COTTAGE

[See page 66.]

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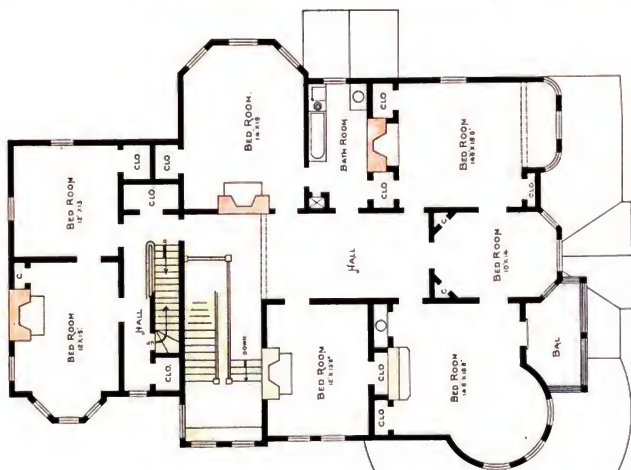


[See page 66.]

A SUMMER COTTAGE AT DIAMOND ISLAND.



A RESIDENCE AT BRIDGEPORT, CONN.

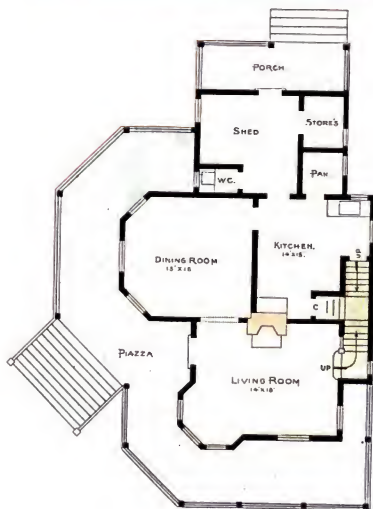


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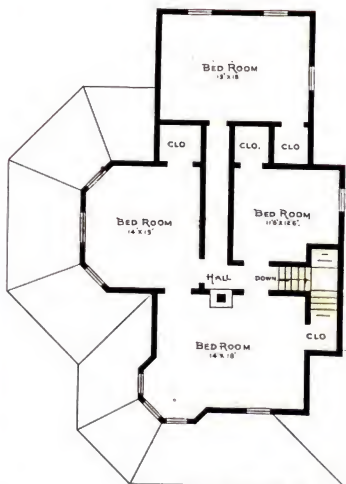




A COTTAGE NEAR PORTLAND, MAINE.



FIRST FLOOR.



SECOND FLOOR.



[See page 66.]

A RESIDENCE AT BRIDGEPORT, CONN.



[See page 66.]

A RESIDENCE AT BRIDGEPORT, CONN.

## EXAMPLES OF ENGLISH INTERIOR DECORATIONS AND FURNISHINGS.

## AN ENTRANCE HALL.

At the Crystal Palace Exhibition, London, Messrs. Godfrey Giles & Co. show how it is possible to have a very grand entrance hall for a comparatively low figure. The room fitted up by them as an example is paneled with lincrusta that has exactly the appearance of oak, and is only about a twelfth as costly. The top part of the walls is papered in imitation of tapestry. It is astonishing how well they get up papers to look like materials nowadays. It would be necessary to touch this particular paper to find out that it was not the real thing; the stitches are imitated to perfection. In the doorways are hung crown-shaped electric lamps. I couldn't help noting that the knights in armor looked as if they had had a fight. Instead of standing up boldly as they should, they stood in the corner leaning limply against the wall. Perhaps they hadn't got the Lord Mayor's visit.

There is also a dining room fitted up by this firm, the decoration of which is handsome even though it isn't what it seems. The walls are paneled with a bluish-gray paper in imitation of stamped velvet, and the novel electric fittings are in reproduction to represent the plinths. The lamp hanging over the

lights burning in quaint Arabian lanterns. It is a delightfully luxurious room. The walls are dark red, and the window is Musharabiyah carved wood. There are many kinds of Eastern rooms, and it is those that are decorated with Japanese fans and screens that make me sick. A room furnished in true Eastern fashion, such as the one I have described, most people would consider charming.

Frank Giles & Co. show a Gothic hall, a Renaissance dining room, and a Louis XVI. drawing room. The hall is quite the grandest I have ever seen. It is furnished exactly as if it were inhabited, and the oak-paneled walls afford to splendid advantage by a display of Delft ware on a shelf going all round the room. Two ornamental old sledges from Friesland serve the purpose of fern stands. In the dining room a striking and rather original effect is produced by the introduction of electric lights into the carved recesses of the ceiling. I explained before how old candlesticks and candelabra may be turned to account. They are fitted with imitation candles of china, and the electric light burns at the top in a little glass bulb hidden by a silk shade. This form of lighting I saw in most of the rooms.

People have taste and need not always in proper proportion. Some have means without taste, and some have taste without means. Either situation is unpleasant, but in these days I should prefer taste with comparative poverty, for now a very little money can be made to go a very long way toward satisfying one's

taste or amalgamate them with the silicates and oxides of iron, will readily disengage the alkalies on becoming wet, and with the evaporation of the moisture a large quantity is carried to the surface and deposited in crystalline form.

The general effects are seen most in smoky cities, where the atmosphere is charged with saline matters, which during rainy weather are lodged against brick walls, and stored there for continuous chemical action. From time to time their increase goes on, until they become great enough in quantity to be readily discerned by the naked eye.

In cities free from excessive quantities of coal smoke efflorescence or exudation of alkalies on brick and stone walls is rarely seen.

A preventive is said to be the coating of walls with a mixture of one part of linseed oil and three parts of spirits of turpentine. This forms a durable, transparent and glossed varnish, that will prevent the formation of alkaline efflorescence and not destroy the soft and natural color of the brick.

## HOUSEHOLD PESTS.

Professor Riley, in a lecture before the Lowell Institute, discussed most precisely the subject of how to get rid of household pests. For certain of the commoner pests, such as bedbugs, carpet beetles, and clothes moths, benzine applied in a fine spray by means of an atomizer was said to be the best remedy, as it destroys the insect in all stages, including the egg. In the use of benzine great care should be exercised that no fire or artificial light is in the room at the same time, as the vapor of benzine is highly explosive. For cockroaches, brittle bugs, fish moths, and fleas Pyrethrum



AN ENTRANCE HALL.

center of the table represents the sun, and is ornamented with the signs of the Zodiac. I ought to say something about the table decoration. It is rather realistic, and consists of a lake of water and little fountains, bounded by a fence of ferns and flowers, with lights gleaming here and there.

## A CHIPPENDALE DRAWING ROOM.

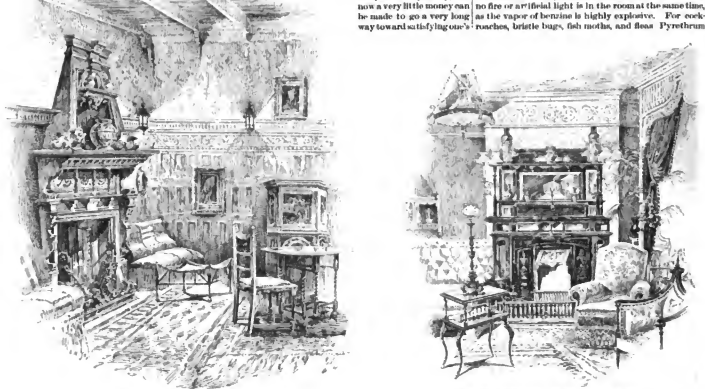
Quite as pleasing, though not half so sumptuous, as some of the rooms I have described is a small Chippendale drawing room with pink walls, furnished by Wallace & Co. (Curtain Road). The glimmer of the Louis XVI. drawing room distracts one. This little room, with its pretty cabinets and comfortable armchairs, can feel at rest in it. It is just pleasantly luxurious. At one end of it, through a fretwork arch draped with velvet, is a mirror that reaches from the floor to the ceiling—an ingenious arrangement for magnifying the size of the room. As a detail I may mention that the ceiling is covered with book paper tinted pink. From the middle of it hangs an electric lamp with a silk shade that throws out a soft, warm glow.

The "Princess Christian suite of rooms," fitted up by Cooper in Great Pulteney street, are really very splendid—especially the French bedroom. This is furnished in whitewood, carved and hand painted, and the electric fittings are little carved figures. The window and bed drapery are rose-colored silk. The Moorish room adjoining has a ceiling shaped like a tent, made of printed Eastern stuff, a delightful corner seat, with a canopy put up with spears, and softly diffused colored

artistic instincts. Take stained glass, for example. It lends itself to useful and effective decoration. It will give to a little room a dim, religious light that can be obtained in no other way. It can be made to shut out the gloom of a wetted day and a dismal prospect. I need not detail all the advantages of stained glass, and I need not say that it is costly. But, though the real thing may be beyond one's means, a very good imitation may not. The very best of all the imitations is MacKay, Stephenson & Orr's "Glasier." In the first place it is easily manipulated. Any one with gumption can stick it on. Sampson himself could not take it off, and the effect is so good that real stained glass might justifiably be considered an imitation of Glasier. The designs are done by special artists, and the subjects range from little children at play to saints—children at play, every one knows, are far from saintly. There are scenes from the life of Christ, knights in armor, and remarkably pretty Japanese designs. Besides these there are center pieces and borders innumerable, which afford scope for your own power of artistic arrangement. With the excellence of the designs of the various pieces, and the brilliancy of the colors they display, no one can fail to produce at least a satisfactory result.—*Pitt Mill Budget.*

## THE WHITE STAIN OR EFFLORESCENCE ON BRICK.

The formation of efflorescence takes place in the following manner: Brick made from clay, having a high percentage of the sulphate of magnesia, soda or potash in their composition, and not sufficiently fired to



A CHIPPENDALE DRAWING ROOM.

powders were recommended. For the destruction of the mosquito the professor recommended Pyrethrum powder moistened, made into little cones, then allowed to dry, and burned in a closed room. The effect, the professor said, is to stupefy or kill the mosquito. The professor thought that it was a mistaken idea, held by many, that mosquito bites sometimes inoculated the body with malarial poison. He said that the idea came from the fact that mosquitoes and malaria flourished usually under the same conditions.—*The Christian Union.*

## PATENTS.

Messrs. Meun & Co., in connection with the publication of the *Scientific American*, have been appointed by the Government as Examiners of Patents for Inventions.

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## DESIGN FOR A STAIR HALL.

We present herewith a very tasteful design for a stair hall, for which we are indebted to the *Architectural Era*. It is from the pencil of Mr. C. F. Schweinfurth, architect, of Cleveland, Ohio, and is from a residence by him designed in that city.

## COUNTRY RESIDENCES NEAR NEW YORK CITY.

On page 72 we give several photographic plates of handsome residences near New York, for which we are indebted to Dr. J. J. Higgins, of No. 35 Beekman Place, this city. In addition to his rare accomplishments as a physician and surgeon, the doctor is an amateur photographer of rare skill, and his recreations in this direction have resulted in many most beautiful and artistic productions. Referring to page 72, it is to be noted that numbers 218 and 219 represent the same house, one picture being taken before the alteration, the other after the addition of piazzas etc.

## A SUBURBAN DWELLING.

Our engraving, page 73, which was made direct from a photograph of the building, taken specially for the *SCIENTIFIC AMERICAN*, presents a suburban dwelling,

pitched and held to the keynote of the room. To find the keynote, sing the natural scale slowly, evenly, and smoothly, or play this scale on piano or organ. The note which is most prominent is the keynote.

## ST. ANDREW'S EPISCOPAL CHURCH, NEW YORK.

We present on page 75 a perspective view and ground plan of St. Andrew's Episcopal Church, which has been recently erected through the untiring efforts of its rector, the Rev. George R. Van de Water, on Fifth Avenue and One Hundred and Twenty-seventh Street, Harlem, New York. The building is in the Gothic style, and it has a frontage of 100 ft. on Fifth Avenue and a depth of 160 ft. It is built of rock-faced Connecticut gray stone, with dressed trimmings. Cluster columns, with ornamental canopies, flank the front entrance, which is fitted with heavy massive doors of quartered oak. The other entrances have similar doors. The building is made impressive by a tower and a steep-pitched roof, covered with octagonal slate. The tower contains a four-dial clock and a chime of bells. The altar table is built of Caen stone and the altar on either side is wainscoted with richly colored marble. The picture representing St. Andrew is placed above

## Curious Foundations.

The *Railway Review* tells of a novel method of laying foundations in swampy soil recently employed by an American engineer. The building to be supported was a low wooden one which it was proposed to use for the storage of machinery. Casks were set in holes in the ground along the line of posts and were filled to the depth of about one foot with iron turnings. The posts were placed in the casks, which were then filled with iron turnings compactly rammed in place. A solution of salt and water was slowly poured over the turnings, under the action of which they solidified into a hard mass. The heat of the oxidation of the iron was so great that the posts were charred. This also served to act as a preservative, and to that extent the iron turnings are probably superior to concrete under similar conditions.

## An Albany House.

On Washington Avenue, Albany, stands a large house of modern architecture, the new residence of W. M. Whitney, of the firm of W. M. Whitney & Co. The drawing room to the left is a marvel of excellent taste and exquisite coloring, with its carved wood work



STAIR HALL, RESIDENCE IN CLEVELAND, OHIO.—C. F. SCHWEINFURTH, ARCHITECT, CLEVELAND, OHIO.—From the *Architectural Era*.

erected for Mrs. F. C. Treadwell, at Bensonhurst, Long Island. Dimensions: Front, 30 ft. 6 in.; side, 48 ft. 6 in.; not including piazzas. Height of ceiling: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 9 ft. 6 in. The tower and piazzas are the principal features. First story clasp-underpinning is built of brick. First story clasp-boarded, and second story shingled, painted light olive green, with bottle-green trimmings. Roof slated. Hall and dining room are trimmed with oak, parlor and library with cherry. The floors are laid with oak. Hall contains an ornamental staircase, with closet under same. Fireplaces, where shown, have tiled hearths and facings, and hard wood mantels. Dining room has a bay window, nook for buffet, and china closet. Butler's pantry is provided with drawers, dresser and bowl, complete. Kitchen is wainscoted and provided with range, sink, dresser, ladder, shed, etc. There are four bed rooms, large closets and bath room on second floor, and four bed rooms on third floor, all replete. Ceemented cellar under whole of house, cost \$3,500 complete. Mr. Walter E. Puritt, architect, Brooklyn, New York.

## The Keynote of an Auditorium.

In rooms of poor hearing qualities Dr. Ephraim Cutler says: Every hall or church has its keynote, and the audience will hear better if the speaker's voice is

pitched and held to the keynote of the room. To find the keynote, sing the natural scale slowly, evenly, and smoothly, or play this scale on piano or organ. The note which is most prominent is the keynote.

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the altar, in a peculiarly good light. The effect is obtained from a glass skylight in roof. It is acknowledged that no such beautiful picture can be found in any other church in this country. The choir stalls are well located. A brass pulpit is placed at the northeast corner of chancel. The font and organ are at the left and the north transept contains an altar table for use on week days. The rector's study and the library are located at the Fifth Avenue entrance, and it is provided with a large open fireplace. The woodwork and furnishings throughout are of quartered oak and highly polished. There is a most convenient and well lighted basement extending the whole length and breadth of the church, which affords ample space for Sunday school room, class rooms, ladies' sewing room, vestry and toilets complete, which receive light and ventilation from the areas at side of building. Seating capacity of church, 1,300. Seating capacity of Sunday school room, 1,000. Mr. Henry M. Congdon, architect, Broadway, New York. Messrs. Mahony & Watson, contractors. The church building committee consisted of Messrs. Donald McLean, A. T. Tinspon, W. R. Ogden, J. B. Simpson, Jr., O. B. Smith and J. L. Reid.

Our engraving was made direct from a photograph of the building taken specially for the *SCIENTIFIC AMERICAN*.

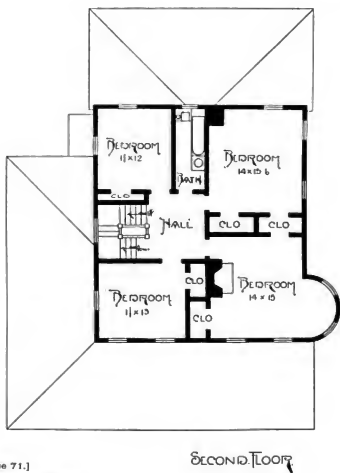
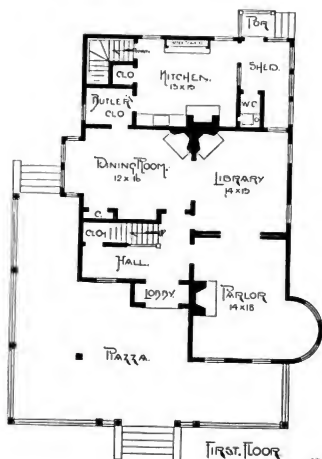
enamel in deep cream, tapestry side walls in gold with Nile green hangings of satin damask and furniture of Louis XIV. style. Across the hall from the drawing room one enters the cozy and richly furnished reception room in blue and gold, these colors being carried out from carpet to ceiling. Entering from either hall or reception room you reach the library, in which the wood work is in mahogany, with moss green and bronze effect carried out in furnishings which are plain but rich and substantial. The dining room is one of the finest in Albany, being finished in fine quartered oak made to represent English pollard oak. The decorations are of a dull green, and the floor inlaid, but nearly covered with a fine India rug. The ceiling is of gold and the furniture of English pollard oak to match the wood work of the room, which is beautifully carved.—*Carpet Trade Review*.

## Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & CO., 361 Broadway, New York.







[See page 71.]

A SUBURBAN DWELLING.

## A HOUSE FOR \$1,100.

Herewith we give a sketch and plans of a convenient and economical house, just the thing for a small family. Our engraving is from the *Builder's Gazette*.

## To Keep Iron Pipes from Rusting.

A simple and economical way of tarring sheet iron pipes, to keep them from rusting, is as follows: The

The location has been carefully considered in the arrangement of the plan and method of construction. Bakerfield being within the warm section of the southern part of the State, the brick walls are built hollow, so as to allow a free passage of air. The projecting cornices, and wide verandas, with thorough ventilation contribute to the comfort of the inmates. The general arrangement is shown on the plans. B. McDougall &

leva, an illegal act in some cities, for it will not only destroy the sewers, but the heat of the steam makes the malarial gases more active, while at the same time it produces a certain amount of pressure that will force the gas back into buildings through the water traps commonly in use. In these traps there is seldom more than three inches of water, and very little pressure is necessary to force the gas through them.

Wherever gas is forced back through buildings in this or a similar manner, the death rate in that locality will certainly be greatly increased.—*The Stationary Engineer*.

## The Senate Chamber New Decorations.

The *Carpet and Upholsterer's Record* reports the way a gushing correspondent describes the new decorations of the Senate Chamber: "A carpet which is a combination of terra cotta, old gold, and crushed strawberry, beautiful to look at and soft under foot, has replaced the garish green affair which covered the floor in the last Congress. The niches above the galleries have been painted a delicate terra cotta to harmonize with the carpet. They now offer a better background to the busts within them. The diplomatic gallery no longer offends the eye with its bright blue upholstery, which has given way to a lining of salmon tint, which is effective. The seats of the other galleries are now finished in gray. The mahogany desks of the Senators contrast handsomely with the carpet and mural adornments."

To prepare transfer paper, take some thin paper or tissue paper, rub the surface well with black lead, vermilion, red chalk, or any coloring matter. Wipe the preparation well off with a piece of clean rag and the paper will be ready for use.



Smith & Robinson Architects  
—Alameda—

A HOUSE FOR \$1,100.

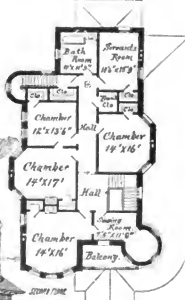
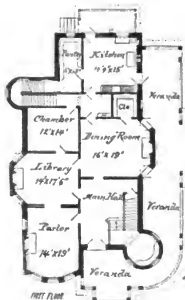
son are the architects. For the above and our engraving are included to the *California Architect*.

## Don't Turn the Exhaust into the Sewer.

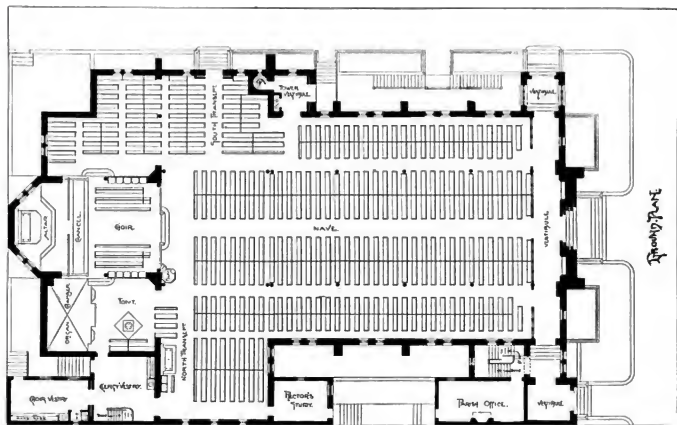
Steam should never be put into a brick or cement sewer, as it has an injurious effect on the same, causing disintegration and collapse within a very short time; neither should it be led into a brick chimney, for the same reason. In some places it is the practice of engineers to turn the exhaust from pump or small engine into the sewers, but this is bad practice, and, we be-

## A CALIFORNIA RESIDENCE.

The residence with plans given herewith was designed for Mr. H. C. Pacts, to be built at Bakersfield, California. The building is of brick, with the exception of the verandas and cornices, which are of wood.



A CALIFORNIA RESIDENCE.



ST. ANDREWS EPISCOPAL CHURCH, NEW YORK. [See page 71.]

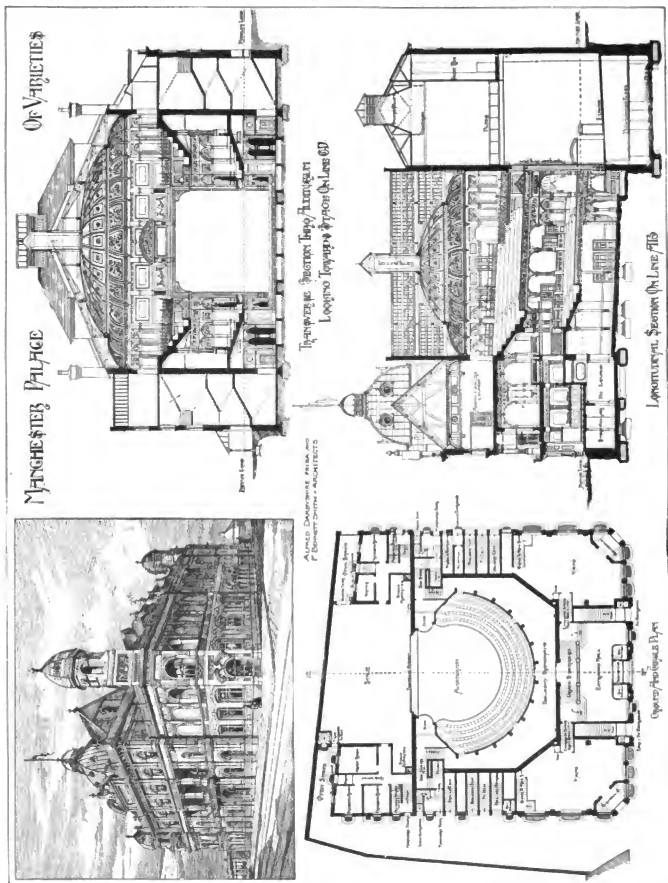
## THE MANCHESTER PALACE OF VARIETIES

We give herewith the perspective and plans of this new building, for which we are indebted to the *Building News*, London. The structure presents suggestions useful to builders who may have occasion to erect works of this kind. This building is located at the

corner of Oxford and Whitworth Streets, Manchester. The theater frontage is 103 ft. 6 in. to Oxford Street and 130 ft. 6 in. to Whitworth Street. The auditorium 90 ft. by 66 ft. and the height from the pit floor to the spring of the dome 60 ft. A novel feature in the planning of the auditorium is that it is placed parallel with the stage and not in prolongation of it. The block of buildings is isolated from the surrounding property. The staircases, corridors, and all portions of the house

used by the public will be fireproof. The dressing rooms and stage are so arranged that each portion can be detached in case of fire. An intervening feature connected with the building is that access can be had from the main tier to the winter garden and foyer on the first floor, the dimensions of which are 66 ft. by 27 ft.

By any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co.,



corner of Oxford and Whitworth Streets, Manchester. The theater frontage is 103 ft. 6 in. to Oxford Street and 130 ft. 6 in. to Whitworth Street. The auditorium 90 ft. by 66 ft. and the height from the pit floor to the spring of the dome 60 ft. A novel feature in the planning of the auditorium is that it is placed parallel with the stage and not in prolongation of it. The block of buildings is isolated from the surrounding property. The staircases, corridors, and all portions of the house

and an outside loggia, connected therewith, fronts Oxford Street. It has been so designed that the stage will be viewed from both the foyer and winter garden. The fireproof staircases, circle tiers, doors, partitions, and auditorium and stage ceilings, executed by the Titancrete Co., with their patent fireproof materials. The decorations by Messrs. Heighway and Depree, of London. The building erected by Messrs. W. Brown & Son, contractors, from the designs of Messrs. Alfred

the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



Floors and their Finish.

The carpenter is not infrequently called upon to finish or suggest a good method of finishing a floor that is not intended to be covered with carpets or rugs—such, for instance, as that of a lobby, schoolroom or meeting hall. A large number of preparations have been put on the market for this purpose, says an English exchange, but it may be fairly asserted that none of them will last for any considerable length of time, but will need renewing every year or so. Some of the patent floor paints are for this purpose fairly satisfactory. The best method of finishing a floor will, of course, depend upon the kind of wood of which the floor is composed. If it be hard wood or hard pine, and is a new floor, the wood may be filled with a good paste and varnished with the special varnish made for floors, and sometimes known as "floor finish" or elastic finish.

When the floor is an old one, or is made of soft pine, a satisfactory finish may be obtained in the following manner: First give a good priming coat of oil and other mixed thin, taking care that the oil is ground fine. Then take one pound fine floor of emery, one pound of litharge ground fine in oil, and three pounds good yellow ochre ground in oil. Mix together with boiled oil and quick rubbing varnish, in the proportions of four of the former to one of the latter, until of the consistency of paste. Thin with turpentine and apply two or three coats. It is important that no more be applied than is absolutely necessary. A coat of floor varnish may be added if desired. The above method of floor finishing is especially recommended for the floors of kitchens, schools, etc.

WAXING FLOORS.

Wax finishing of floors is, in the experience of many, the most durable and satisfactory of all floor finishes. The advantage it possesses is that wax and tallow only serve to make it, within certain limits, better—that is, if it is properly looked after. When an oil floor is to be waxed it should be thoroughly scoured with scouring soap, ammonia being freely used where necessary.

When dry, apply a coat of shellac. Rub down thoroughly with fine sandpaper and oil; then apply the wax and polish. This method is particularly well adapted when it is desired to finish a floor quickly. The wax may be purchased ready for use, but may readily be prepared by heating white wax and adding turpentine until of the consistency of a paste. To keep waxed floors in good condition they should be frequently rubbed up, and it is desirable, therefore, to leave a little of the wax with the occupants of the house, with directions to occasionally renew the work. It may appear at first sight that this would be an unbusinesslike proceeding, as it would destroy the chance of the tradesman being called in to touch up the floor himself. It should be remembered, however, that when the floor is kept in a good condition for a long time in this way a valuable reputation for good work is obtained, which will probably bring in far more than any possible loss by reason of the occupant "doing it himself."

When old floors become spotted they may be made to look "as good as ever" by applying a solution of ammonia and water, half and half, thoroughly washing off and polishing with wax. A method of finishing floors which possesses the advantage at least of durability is as follows: Take boiled linseed oil, heat it to boiling point, and immediately pour it over the floor, distributing it and rubbing it around with an old stubby brush. Take care that the floor is dry and free from dust. After say five or six hours, rub off with old rag or sacking all the oil that has not dried in. A floor prepared in this way will look well for a long time.—(Carpentry and Building.)

Bedroom Furnishing.

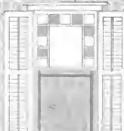
In no apartment in the house, says *Purcell and Decoration*, is such simple taste so welcomed and appropriate as in the bedroom. Here there should ever be an air of quiet and repose and a complete absence of all extraneous decorations and assertive colors. An air of subdued harmony should invest the entire apartment; and walls, ceiling, floor coverings, wood work and hangings should all be selected so as to unite all together and form a peaceful *ton ensemble*.

Various schemes of decoration of course permit of the employment of a variety of woods for furniture of the bedroom. Where delicate olive green or subdued blues prevail upon the walls, etc., it is well to employ dark cherry colored mahogany or rosewood. Where rose color or warm yellow or salmon is preferred, then the introduction of an ivory white enameled suite would be most desirable, and so on in like manner with the rest of the furni-

ture woods it is absolutely necessary to maintain a sympathetic coloring on the walls, etc., if a restful and tasteful effect is to be accomplished. The repetition of this tedium may, perhaps, seem superfluous to some of our readers, but it is astonishing how frequently it is violated.

MODERATE PRICE SCREENS.

Fly screens for doors and windows have grown to be a modern necessity. With the growing demand for these goods, numerous factories, some of them very extensive, have arisen. The warm weather comfort seeker can obtain from the stores a great variety of



MODERATE PRICE SCREENS.

adjustable screens. If he is wealthy, he can get the elegant polished affairs made up to fit his windows. It is obvious that screens made to order are the most desirable, if you can afford them. One of the largest screen door and adjustable window screen factories has recently added a department for making to order, on a large scale, screen doors and windows at moderate prices. The most expensive window screens are usually of polished hardwood and must of necessity be put inside the sash to protect them from the weather. The factory mentioned (A. J. Phillips & Co., Pontiac, Mich.) contend that for utility and comfort, a screen should be outside the sash; it is then out of the way of curtains and inside blinds and does not interfere with raising or lowering the sash.

Outside screens require no higher finish than to correspond with the outside of the house, hence should be cheaper. Messrs. Phillips & Co. claim to have a very neat, handsome screen with special machinery and equipment for making it rapidly and well at very reasonable prices.

AN IMPROVED HOT WATER HEATER.

We show herewith broken-down view of the new Capitol Hot Water Heater, whose manufacturers claim for it that it is not only the handsomest heater made and the one that takes up the least room, but that it is the one that heats water the hottest and quickest and



THE "CAPITOL" HOT WATER HEATER.

keeps it hot with the least fuel. They state that all who have seen the Capitol like it at once. It is shipped in sections, easy to handle, and quickly set up. It has few water joints, and they are screwed together, all metal, and all practically outside the heater, away from the action of the fire and accessible for any necessary tightening without disturbing the fire, or even opening a door. A broken section can be shut off and the heater run without it until a new section can be put in. The change can be made without disturbing the rest of the heater or the piping. The Capitol is also exceptionally well planned for ease of cleaning and management. It is made by the Capitol Heater Company, Detroit, Mich., who will give full particulars on application.

The Compensation of Architects.

Perhaps the most curious of all modern business arrangements is the bargain now in vogue between the architect and his client. The financial interests of the architect and his client are diametrically opposed. In the case of an ordinary business trustee, it is customary to pay him a commission upon the income he is able to turn over to his client from moneys invested, so that the greater the client's benefit financially, the greater is the trustee's reward. The trustee's diligence and care have their reward in an increased commission. In the architect's case the reverse is true. The better he serves his client, the more his commission is reduced. Suppose by diligent labor and study he discovers a mode of reducing the cost of the building some five thousand dollars, by making certain considerable changes in his drawings. By this added labor he saves the owner this sum plus five per cent. commission upon it, or five thousand two hundred and fifty dollars. In recompense of this display of diligence and faithfulness to his client, the latter deducts from the architect's payment two hundred and fifty dollars on the commission saved. But the cost to the architect is further increased by the cost of changing his drawings, the time consumed in studying these changes, and the loss of time to his client, the latter should receive; so that, to save the owner some thousands of dollars, he has to reduce his own profits by an equal number of hundreds. It is obvious that an arrangement having such results sets a premium upon hasty and superficial work, and it is strange that the careful business architect, who is so generally supposed to have already discovered a remedy for a situation so anomalous from a business point of view.—*The Architectural Review*.

French Observations on American Construction.

A French engineer, M. P. Germain, who has recently made a tour in the United States, writes to *Le Guide Civil* some observations on the great American fireproof buildings. To use his own words, "These buildings fulfill a very requirement, which the American architects have met boldly and frankly, and in many cases, they have carried out their programme in the happiest manner. These constructions have a great variety of aspect; many present defects of taste, but among the number are some extremely beautiful ones, the products of true artists. I am convinced that we are now witnessing the birth of a new style, which will characterize its age as our cathedrals and castles characterized the Gothic epoch. One cannot too earnestly address architects and engineers to pay the closest attention to what is now going on in the United States." Like most foreigners, M. Germain finds himself much impressed by the ingenuity with which services of electricity, gas, hot and cold water, steam, and even refrigerating currents, are applied throughout our great buildings; but he finds our methods of construction the most interesting subjects of study, and particularly describes, as worthy of imitation in France, our common system of freeproofing iron columns and beams.—*An. Architect*.

THE CANTON STEEL ROOFING CO., of Canton, Ohio, have issued their sixteenth annual catalogue and reference book. This company make the H. W. Smith folded lock sheet metal roofing, and all styles of steel metal roofing, siding and ceiling, sheathing papers, roof paints, etc. Also the Welch patent slip joint eave trough, all styles conductor pipe, hangers, cut-offs, strainers, crappings, flash, etc.

We are informed that a very large aluminum bronze casting has recently been made by William C. Mackover, of Pittsburgh, for a sugar refinery in South America, the casting weighing 8,343 lb. It is understood that this is the largest single piece of aluminum bronze ever made.

## A SPEAKING TUBE AND EARPHONE.

The accompanying illustrations represent the practical working of an extremely simple improvement in



SCHLUCHTER'S SPEAKING TUBE—USE IN A VESTIBULE.

speaking tubes, the mouth piece being provided with an attached ear piece, whereby messages may be more conveniently received and transmitted. This improvement has been patented by Mr. Frederick Schluchter, of No. 3901

Atlantic Avenue, Brooklyn, N. Y.

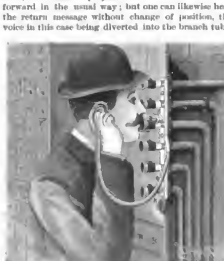
One of the pictures shows the improvement in use in the hallway or vestibule of a house, another representing its employment in a factory, where the different floors are thus held in communication with the office. The mouth piece may be of the usual form, but the tube in front of the whistle has a n

DETAILS OF SPEAKING TUBE.

opening at one side, surrounded by a tube leading into an attached flexible tube, at the end of which is an ear cup. The branch tube leading to the side opening, in front of the mouth piece, leads backward at a slight angle from the main tube, and the branch tube is also made tapering; the flexible tube being secured to its smaller end. When a person blows into the speaking tube, the air exerts its full force upon the whistle in the usual way, not being diverted into the branch tube. In like manner, in speaking into the tube, the voice is projected forward in the usual way; but one can likewise hear the return message without change of position, the voice in this case being diverted into the branch tube.



SCHLUCHTER'S SPEAKING TUBE.



SCHLUCHTER'S SPEAKING TUBE—USE IN A MANUFACTORY.

and thence through the flexible tube to the ear cup, so that a conversation may be carried on without cessation, changing the end of the tube from the mouth to the ear, and vice versa. A fork supports the ear cup when the mouth piece is not in use. This improvement can be readily applied or attached to any existing system of speaking tubes.

This invention has also been patented in Canada, England, France, Belgium, Germany, Austria, Italy, Switzerland, and Spain.

## Diamond Wall Finish.

The last decade has witnessed great improvements and great changes in our methods of building. A material that is entirely new and highly important is the Diamond Wall Finish, manufactured by the Diamond Wall Finish Co., of Grand Rapids, Mich. Its popularity and large sales are due to the merit of the goods, for they quite revolutionize the old methods of finishing walls and ceilings giving, in place of the temporary whitewash and whitening and glue-kidney, a natural and lasting finish, made from a base in itself a cement, not dependent on glue to hold it on the wall. Diamond Wall Finish admits of successive re-coating, when originally applied to a clean surface, for any length of time and without having to wash and scrape off former coats before re-coating. The goods are largely used by the best decorating firms in the country, and work equally well and are economical on a plain job of wall tinning. The goods are adapted to be used in factories, warehouses, etc., as they are whiter than paint, will not discolor and are absolutely fireproof. Parties contemplating building should at all events investigate for themselves.

## Fireproofing Receipts.

Prices were awarded for the following finishing process for fireproofing, respectively: Discharging the combustibility of timbers, curtain materials, and the atrial scenery. For light timbers, 16 pounds ammonium sulphate, 5 pounds ammonium carbonate, 4 pounds borax, 4 pounds boric acid, 4 pounds starch, or 1 pound dextrine, or 1 pound gelatine, and 25 gallons water mixed together, heated to 86° F., and the material impregnated with the mixture, and then calcined as usual. One quart of the mixture, costing about threepence or fourpence, is enough to impregnate 13 yards of material. For curtain materials, theatrical decorations, wood, furniture, 30 pounds ammonium chloride are mixed with so much bleached caulk as to give the mass consistency; it is then heated from 135 to 140° F., and the material given one or two coats of it by means of a brush. A pound of it is sufficient to cover five square yards.

## AN IMPROVED HOT WATER HEATER.

The hot water heater shown in the cuts is made by the J. F. Pease Furnace Co., of Syracuse, N. Y., and the company claims for it a most substantial and durable construction. While the heater is comparatively a new one, its strongest feature, the boiler or fire surface, has had a satisfactory time test in the combination water and air heaters made by the same company. It is claimed that the heater is constructed with reference to a consistency between fire and grate surfaces and in such a manner as to make every square foot of fire surface effective. The water circulation is positive and continuous. A corresponding circulation of both water and combustion products is established through and over the water-heating sections. The sinuous course of the water circulation is of the same character as that of the combustion products.

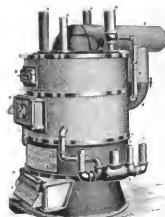
A reference to the transverse view will show an unobstructed water course which is formed over the fire a number of times at its highest temperature. At no point can the water entering the fire pot find exit at the flow pipes without repeatedly passing over the fire and its products. The fire surfaces are so arranged and presented to the fire that every square foot must be touched by the fire travel before the smoke flue is reached.

In addition to the fire surface thus obtained, the hollow fire pot, it is claimed, is made an especially effective fire surface by special construction in the grate, which permits a direct draught around the sides of the pot, and thus stimulates a strong combustion at the sides of the pot. Facility for dislodgment of ashes around the sides of the pot prevents accumulations which otherwise would impair the efficiency of the pot for practical heating surface.

The two water sides, each extending from feed door to direct draught pipe, prevent external waste of heat in cellar and provide a supplementary circulation of water. The lower part of each side is connected to the return head by pipe, L, and the upper part to flow outlet by pipe, M.

A peculiar advantage over ordinary sectional water heaters is claimed in the erection of the

heater. The water heater proper is put together by extra strong nipples in two parts at the works, and thoroughly tested before shipment. The lower section, C (transverse view), is connected to the hollow fire pot, L, and the three sections above are fitted together. This leaves for the local fitter but one inte-



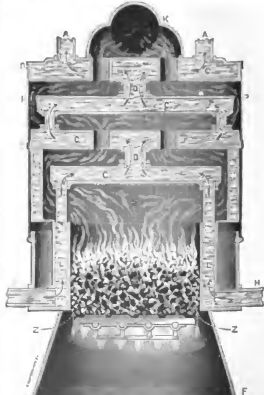
THE ECONOMY HOT WATER HEATER.

rior connection to make—the large nipple connection between the first and second sections, C, C.

Further particulars concerning this heater can be obtained from the J. F. Pease Furnace Co., Syracuse, N. Y.

THE KINKEAD & GAGER Co., of Columbus, O., issue a neat catalogue of their steel ceilings, patens, raincoatings, cornices, etc., as such work has been put up in many prominent places in public and private buildings. The ceilings made under the Kinkead patents have been placed in fourteen committee rooms in the United States Capitol, Washington, D. C. The company have lately erected a new building 100 by 157 ft. in size, and added a large amount of machinery to their plant, such enlargement of their facilities having been called for by their increasing business.

THE STEEL IRON AND STEEL ROOFING COMPANY, of Niles, Ohio, issue a very interesting catalogue in which they give a brief description of how iron and steel are produced, taking the raw material at the blast furnace, and following it through its different processes of manufacture. The company also have works at Chicago, Illinois, and in both places their plant is supplied with all the latest improved machinery, their facilities being unsurpassed.



THE ECONOMY LOW PRESSURE HOT WATER HEATER—SECTIONAL VIEW.





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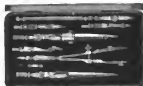
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(Continued from page 14.)

side the grill and under inside. The curtains will, of course, be removed in the high-pressure solution. A curtain is measured by anyone, not by using known your characteristics of your curtain is a suggestion.

(4) O. O. E. says: From a spring 10 rods distant and 40 ft. tall, few heads, what else you would I have to lay down to get four horse power from the water that are made for such purpose? For two horse power. A. You will require a 6 inch pipe, expelling 60 cubic feet of water per minute. Go back pipe for two horse power, 20 cubic feet per minute. You should know the flow from the spring for the power that it will produce. A 4 foot diameter nozzle will give you four horse power and a 36 inch nozzle will give you 10 horse power with the quantities of flow as above stated.

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(6) G. W. F. R. asks: What provision can be made for properly carrying of water consumed from a cellar, when the cellar is below point of sewage plant? A. Water cannot be lifted without power. The provision and facilities for the same you have not stated, so that in a general way we can say, if you have gas, a small gas engine and pump is recommended. If not, a petroleum or gasoline engine and pump, such as is advertised in our columns, is in order. If you have provision for accumulating a small waterfall away from the house, with a section pipe leading to a dam, consequent in the cellar and discharging into the drainage system, you will find it an inexpensive and easily managed way to do so that we can name.

(7) W. L. M. says: I am building a house, and to secure ventilation intend to place ventilating registers in the sides of the walls, open space between the partition walls being used as a ventilating shaft. Above the attic floor a tube will connect with this shaft and be run either into the chimney flow or out under the eaves of the roof. Now the question is: I want answered are these? 1st. Should the ventilators be placed near the floor or near the ceiling? 2. Will the hot air ascend this shaft? 3. Would it be better to run the tube connecting to the air shaft into the chimney flow or out under the eaves of the house? 4. For the arrangement of ventilation in the room there should be one at the bottom and one at the top for

(Continued on page viii.)

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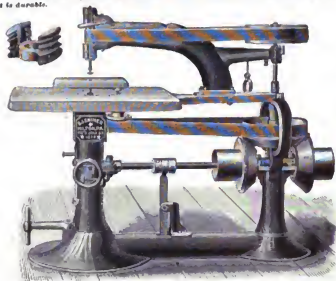


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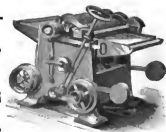
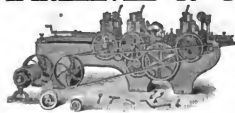
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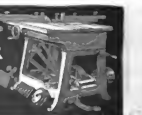


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NEW YORK, JUNE, 1892.

Single Copies, 25 Cents.

No. 6.



A CHURCH AT UPPER MT. CLAIR.

[See page 81.]



## A CHURCH AT UPPER MONTCLAIR, N. J.

The engraving on page 79 presents St. James' Episcopal Church, at Upper Montclair, N. J. The design is picturesque. The exterior walls are built of local rock-faced stone, laid up at random with trimmings of Indiana limestone. Steps of brownstone. Roof covered with blue slates. The auditorium, 30 x 60, has a seating of 180 as now arranged, but if necessary 300 can be easily accommodated. The pews are of ash. The roof screen, chancel rail, altar and altar table are built of antique oak, highly polished, and designed by Tiffany & Co., New York. The roof screen has oak columns, with carved capitals extending to ceiling, supporting Gothic arches. The windows throughout are glazed with delicately tinted cathedral glass. The roof beams are exposed to view and are dressed and

bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, cork, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN'S office, New York.

## A RESIDENCE AT LUDLOW, N. Y.

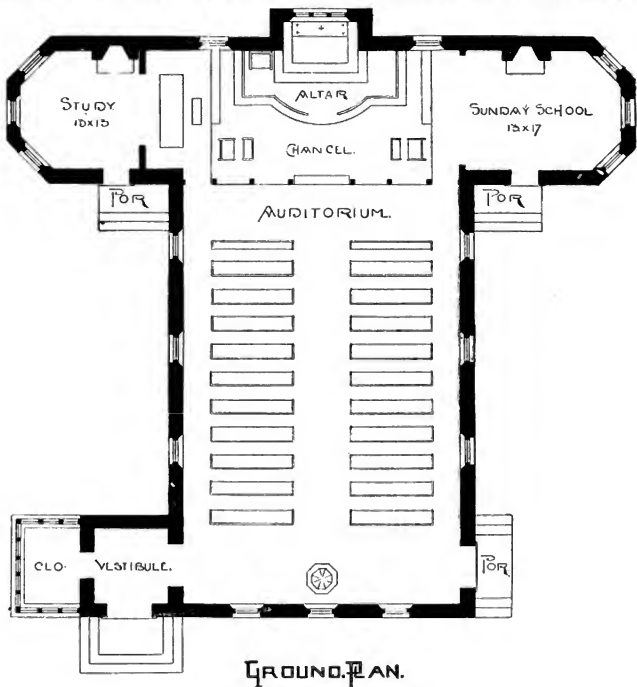
We present on page 90 a residence recently erected for Theodore Crane, Esq., at Ludlow, N. Y. Dimensions: Front, 86 ft.; side, 58 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. Foundation, stone. Underpinning of brick. First story clapboarded. Second story shingled. Roof shingled. Painted pearl

boards complete. Bath room is wainscoted and fitted up in the usual manner. Cemented cellar contains furnace and other necessary apartments. Cost \$4,500 complete. Mr. Benjamin Silliman architect, Yonkers, New York.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

## A SUMMER RESIDENCE, ASBURY PARK.

We publish on page 91 a summer residence, erected for William Mills, Esq., at Asbury Park, New Jersey, from plans prepared by the proprietor. Dimensions: Front, 41 ft.; side, 56 ft., exclusive of piazza and porticoes. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The principal feature



## A CHURCH AT UPPER MONTCLAIR, N. J.

ornamented. Sunday school room, 15 x 17 ft., and rector's study, 13 x 13 ft., are connected with auditorium by double folding doors. These apartments are well lighted and provided with outside entrances and open fire places furnished with tiled hearths and slate mantels. Cemented cellar, under whole of building, contains furnace and other apartments. Cost \$5,000 complete. Lamb & Rich architects, New York.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful

gray, with dark gray trimmings. The hall is trimmed with California ash. It contains a paneled wainscoting, divan and staircase with carved newels, posts, etc. This hall and staircase are lighted by windows glazed with stained glass. The principal rooms on first floor are connected by double sliding doors. Parlor is trimmed with cherry and it is provided with an open fireplace, furnished with a tiled hearth and a hard wood mantel, with mirror, etc. Library and dining room are trimmed with oak. The latter having a paneled wainscoting and fireplace. Kitchen and its apartments are trimmed and wainscoted with white pine, finished natural and furnished complete. There are four bed rooms, den and bath room on second floor, and two bed rooms and trunk room on third floor. These apartments are trimmed with whitewood finished natural. The closets are provided with wash

is the spacious piazza and veranda. The underpinning is built of brick, while the building above is of wood, clapboarded and painted pearl gray, with bottle green trimmings. Roof, slated; lobby has a tiled floor; hall, trimmed with ash, contains an ornamental staircase. Parlor is trimmed with cherry, and it has an open fireplace, built of brick and furnished with a tiled hearth and mantel. Library is provided with fireplace, with bookcases on each side of same. Dining room is furnished with four chin closets. Kitchen and its apartments are wainscoted and fitted up complete. There are five bed rooms, large closets, and bath room on second floor, and four bed rooms on third floor. Cemented cellar contains furnace and laundry. Cost \$4,500 complete. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.





A COTTAGE AT BENSONHURST, N.Y.







A RESIDENCE AT PLAINFIELD, N. J.



FIRST FLOOR.



SECOND FLOOR.

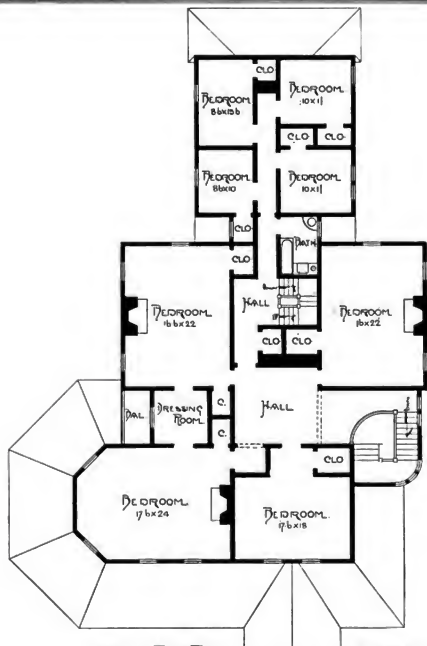




Scientific American.



CRESCENT BLOCK, BRIDGEPORT, CONN.



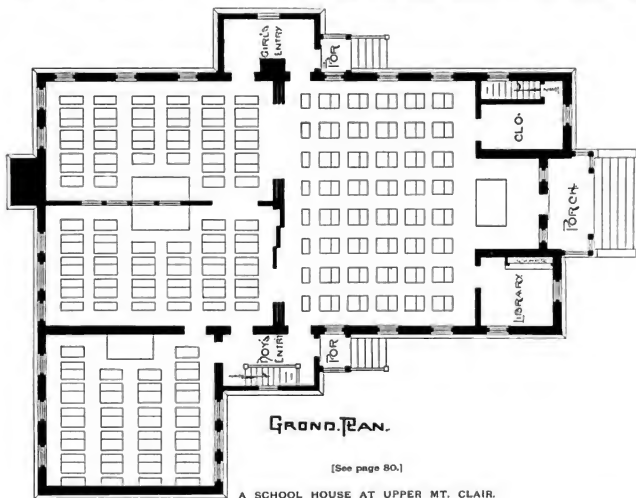
[See page 80]

SECOND FLOOR PLAN.

A RESIDENCE AT BABYLON, N. Y.









[See page 80.]  
 203. Mr. Tingle's Residence, Portchester, N. Y.  
 282. Mr. Augustus Mead's Residence, Belle Haven, Conn.

328. Residence on road from Portchester to Rye Lake.  
 300. Mr. W. B. Higgins' Residence, Belle Haven, Conn.

63. Facade, Jewish Synagogue, Lexington Avenue, N. Y.  
 71. Refreshment Pavilion, Central Park, N. Y.

# PROPOSED RAILWAY TOWER FOR THE COLUMBIAN EXPOSITION.

Among the numerous designs submitted for a tower for the Columbian Exposition is one as shown in the accompanying cut, taken from a sketch made by J. E. Harriman, Jr., a civil engineer of Boston.

Mr. Harriman has not only designed an observatory tower, but has combined with it the novel feature of a winding slide all the way from the top to the bottom.

This scheme would give passengers the opportunity of viewing the magnificent scenery and beautiful buildings of the fair from the different altitudes as they come down, each time describing larger circles and covering more space until they reached the bottom.

It will be seen that the proposed tower consists of four double main columns, coming together at the top, on which rests a building to be used as an observatory and for other purposes. Running from the center at the bottom perpendicularly to the top is a shaft to be used in carrying up the elevator cars and passengers.

It is proposed that each car shall have a guide or conductor, and be arranged to carry ten passengers. Starting from the bottom of the tower, the car would be carried up to the top, where the party alights and a party ready to descend takes in.

The car then leaves the elevator well, and enters upon the slide that is to carry it back to the starting point.

This slide descends on about a five per cent grade; the car to be controlled by automatic brakes as well as by the conductor. The sides of the slide are protected by steel gratings, and it has a water and sun proof top. When the car has almost reached the ground, the guide ascends again and brings the car to a standstill by the time it reaches the starting point.

The architect has not affixed any definite height to the tower, which could vary from that of Bunker Hill Monument to the height of the famous Eiffel Tower. If the tower was 300 feet high the slide would be about 19 miles long; if 1,000 feet high, the slide would be nearly four miles.

The cars would be kept at a reasonable distance apart, and not travel faster than the electric street cars.

Other means of ascending and descending would be by regular elevators, which pass up and down the column as in the Eiffel Tower.

The room necessary for the proposed tower would be only the space taken up by the columns, as it could be erected over the largest of the buildings or a large area could be made of the space between the columns.

The structure is designed to be made of steel, and the slide is supported by wire cables and rods. It would be all made in sections, and bolted and riveted together, and could be easily transferred by taking it apart.—*Boston Herald.*

## THE CITY HALL, PHILADELPHIA.

The magnificent new City Hall, which has been in course of construction for twenty-one years, is now sufficiently near completion to accommodate many of the city and county offices, and some of the courts, all of which will eventually be removed to this noble building. The great pile of white marble, larger than any other single building on this continent, is surrounded by a grand avenue, 185 ft. wide on the eastern, western, and southern fronts, and 305 ft. wide on the northern front. The dimensions are 420 ft. from east to west and 480½ ft. from north

to south. The structure contains 750 rooms, fitted with every convenience in heat, light, and ventilation, the whole being absolutely fireproof and indestructible. Its cost, thus far, has been about \$10,000,000, exclusive of the site, which represents a value of at least \$3,000,000 additional.

Several millions and several years will be required to complete the work. On the north front of the building rises the tallest tower in the world, surmounted by a heroic statue of William Penn, 36½ ft. in height. From the sidewalk to the crown of

bitumen pressed into blocks, which are laid like bricks or wood paving. The special advantage of the material lies in its elasticity. When used for pavement it gives a soft tread which is exceedingly pleasant, recalling the feel of a carpet. In roadways it furnishes a splendid foothold for horses, and at the same time almost abolishes the noise which is such an unpleasant feature of city traffic. A short piece of pavement is to be seen in Liverpool Street, E. C.; while the outlet to Pickford's yard in Greenlan Street is laid with this material. It yet remains to be seen how it will bear the ordinary traffic of a London street, but there is evidence to show that in Australia short pieces of roadway have given good results.

## Best Treatment of Hard Wood Floors,\*

My object in treating this subject is not to lay down iron-clad formulas for the treatment of hard wood floors, but to give some suggestions from my own experience in finishing them. I am amazed sometimes, in reading specifications in regard to finishing floors. In looking over specifications the other day, I found they called for two coats of oil finish on a maple floor. And again, I read: "Finish all the hard wood floors with three coats of raw linseed oil, well rubbed down." It was a great mistake. I did not finish them in that way. I prefer to give all hard wood floors a coat of hot linseed oil and drier before filling, as I have obtained the best results from so doing. I recommend pure gum shellac for the finish of floors. I have no faith whatever in wax finish, as it gums up, turns black, and is readily stained, and will not wear.

Penn's broad-brimmed hat the distance will be 347 ft. 3½ in.

The next highest building on the earth is the Colosseum Cathedral, 310 ft. The Washington Monument is 32½ in. higher, but cannot properly be classed as a building in the same sense as the City Hall. The latter will be 67 ft. higher than the Great Pyramid, 100 ft. higher than St. Peter's, Rome, and 187 ft. higher than St. Paul's, London, while it nearly doubles in altitude the Capitol at Washington.

The tower has now reached a height of 337 ft., and it is estimated that it will cost a round million dollars to finish it.

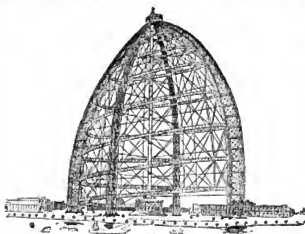
## Cork Pavement.

A new material for paving is now being introduced into London. It is composed of granulated cork and

What kind of floors is the finisher called upon to finish to-day? Mostly oak. The finisher has arrived the house to finish the hard wood floor. The carpenter has just left; the floor is oak, narrow strips, planed and scraped already. The carpenter was thoughtful enough to have the same painted on the under side, at the suggestion of the architect, which should be done in every case for a well finished floor. A coat of hot oil, as I have suggested, penetrates the pores, gives lasting properties to the floor, and does not resist the filler, as you would suppose. Give floors a heavy application of mineral filler, rub the filler into the pores of the wood thoroughly, and clean off the surface, leaving the same perfectly free of the filler. Now we are ready for the shellac. Sand her smooth, ly, one coat of orange or white shellac, putty up all holes or defects. Great care must be taken to have the putty match the wood, as this is very important in a well finished floor. Give one or two more coats of shellac, rub between each coat, and finally rub down with fine sand and crude oil. Not to a polish, however, as that would make them very slippery; but rub enough to give them a dull finish.

I was called upon last July to finish all the floors in one of our best houses. The floors were oak and the finisher had finished them in brush wax. They had been done only a short time. They were in a bad condition—black, stained, and badly worn at the thresholds. I had them cleaned down to the filler, finished with two coats of white and orange shellac, and rubbed down with crude oil and pumice. They looked well and are in good condition to-day. Parquet floors and borders are in great demand, and I think will soon take the place of carpets. (Continued on p. 89.)

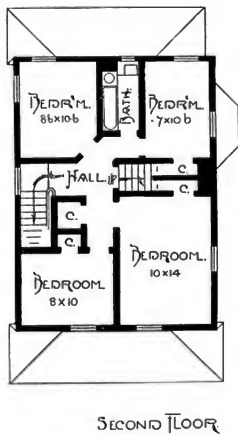
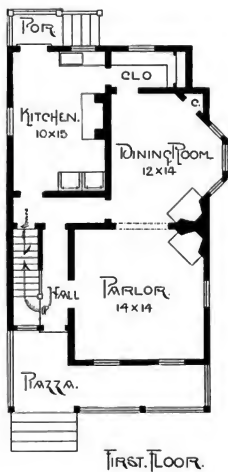
\* Paper read before the New York Association of Master Painters and Decorators.



RAILWAY TOWER PROPOSED FOR THE WORLD'S FAIR.

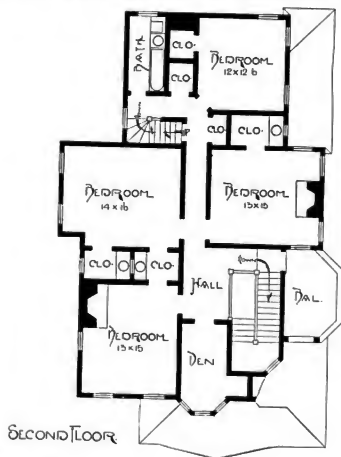
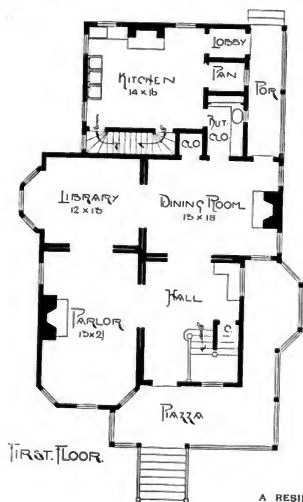


THE CITY HALL, PHILADELPHIA.



[See page 80.]

A DWELLING OF MODERATE COST,



[See page 81.]

A RESIDENCE AT LUDLOW, N. Y.





[See page 81.]

A SUMMER RESIDENCE ASBURY PARK,

## Best Treatment of Hard Wood Floors.

(Continued from page 88.)

in the better class of houses. They are sanitary and, used with rugs, furnished very effectively. What is the best way to finish them? Made, as you know, of oak, cherry, mahogany, maple, walnut, etc., fill the floor and stain such strips as ebony and dark woods. After the coat of shellac, putty, sand-paper with fine paper, one or more coats of shellac, and afterward rub down with pumice and crude oil.

I have said nothing in favor of floor varnish, ship-lum, and many other finishes for floors; but on these floors a good floor varnish can be used. Why? Because hard usage gives them cause for a frequent washing. They need a good body. These floors need no filler. Give them a coat of hot oil and dry and two coats of varnish. There are several makes I could recommend as having used them with good results, but it is not my purpose to advertise any firm in this paper. If the gloss is objected to, the same can be rubbed down. The objection to varnish on hard wood floors is the shiny and soft nature of the stock, showing nail marks, and in my opinion is not a first-class finish for fine floors. I once saw a reception room floor finished with varnish and rubbed. The plane marks and slight imperfections were brought out distinctly, and it had a coarse look, not like shoe floors, as they are much harder and resist the heel marks. Bathroom floors, in all cases, should be oiled before tiling, and finished with a spar or floor varnish, and rubbed to a dull finish. Wax should never be used on these floors. This is a great fault in finishing floors. As a rule, they are the last job to be finished in a building, and then it is "Hurry, I want to get in." The finisher fills the floor in the morning, puts on a coat of shellac at night, one the next morning, and the floor is finished. How long will it last? No time at all. The fact that he should it in a hurry is forgotten, the job is a bother and anathema are heaped on him; partly his own fault. The old adage would apply here, "A job worth doing at all is worth doing well." Be honest with the customer and tell him it should not be done. Give plenty of time between coats to harden; the floor will last longer, and your business will increase by so doing.

Our specifications call on us, many times, to finish maple and ash floors, in kitchens, of dwellings, in several ways—oil finish, as I have referred to, and varnish. But I think it is a mistake to put anything on them except to oil them, one coat, after being laid, with hot oil. When called upon to refinish floors that are not in bad condition, it is well to clean them and repolish with equal parts of raw oil and turpentine with a chambré or soft cloth. The care is not taken with hard wood floors in our country as in the old, where a great deal of time is spent cleaning and polishing and soft slippers are furnished the guests.

## THE TWIN STAIRCASE.

The illustration shows a form of staircase adapted for use in places where space is limited, for two staircases are here provided, occupying less room than would ordinarily be required for one. With this arrangement one of the staircases can be appropriated for parties ascending and the other for those descending. This method of construction is suggested as particularly adapted for cabins of ships, picture galleries, show rooms, and temporary structures where there is likely to be a constant flow of visitors, as it can be put up at comparatively small expense. It is merely an adaptation of the properties of the spiral curve or springing arch. The ascent is steep, there being thirty-eight steps in each semicircular flight, the height being twenty-three feet. The length of the step is four feet, and that of the outer string board thirty-seven feet. The rails are continuous, so that a person ascending and placing either hand on the rail may continue with the same on the rail during the ascent, all the way across the circular corridor which forms the upper landing, and down by the opposite flight.

The first common schools established by legislation in America were in Massachusetts, 1645; but the first town school was opened at Hartford, Ct., prior to 1642.

## THE ELECTRIC STAIR CLIMBER.

Electricity in all its forms is entering further and further into the uses of centers of human population, and its various applications to lighting, metallurgy, and to the mechanical transmission of power in manufacturing, and has for the last fifteen years shown incessant progress.

In addition to the important applications of Indus-



ELECTRIC STAIR CLIMBER.

trial order, there are others of a more modest character which respond more the less to our daily needs, and render a host of minor services.

In this category we mention the interesting electric stair climbers which Mr. J. A. Amiott, the engineer, exhibited this year at the Exposition of Labor at the Palace of Industry, Paris, and which obtained a deserved success.

The electric stair climber consists, essentially, of a car rolling upon two superposed rails and carrying a box, and of an electric windlass which actuates the car through a steel cable guided by rollers.

This brief description, which the accompanying engraving will make better understood, shows the simplicity of the arrangement adopted.

the cable (which is calculated to resist a traction of 15,000 pounds) chances to break. Experiments made at the Exposition of Labor in simulating an accident of this kind always succeeded.

The stair climber has the advantage of occupying, in width, only about twelve inches of the steps of the staircase, a little less than is taken up by a person going up or down—that is to say, in the part necessarily unused for travel. It is, as may be seen, adaptable to all existing staircases without requiring any essential modification or any measure of work. The rails are simply fixed by bolts to the banisters, which are consolidated thereby.

As for the electric current brought into play, that is feeble, and the conductors that convey it being out of reach of the hand, no shock is possible. The current is obtained by simply connecting the motive apparatus with the street distributing wires. In the exceptional cases in which there is no such line of wire, a gas, petroleum or compressed air motor, or batteries or accumulators, may be installed. The electric installation lends itself naturally to the lifting of every house and staircase independently of the hoisting of visitors.

Let us add that the maneuvering of the electric stair climber is of extreme simplicity. The person who makes use of the apparatus operates it himself, through the shifting of a lever, which he has under his hand, and around which are marked the words, "Up," "Stop," "Down." Buttons upstairs and down permit of calling the apparatus at any point of the staircase where it chances to be, and a peculiar safety device prevents any false maneuvering. Finally, the apparatus ceases automatically at the end of its travel, so that no forgetfulness or negligence on the part of the person who is using it is to be feared.

Upon the whole, Mr. Amiott appears to us to have obtained in the stair climber that he has constructed a practical apparatus, which is utilized in every staircase whatever without much expense and which causes no disturbance in the use of the staircase itself, for it makes no noise and occupies an extremely small space. It affords valuable advantages to the tenants as regards the facility of occupying the staircase, and also to the landlord, who will be able to let such apartments more easily.

This apparatus deserves to be classed in the highest rank among the applications of electricity to the home that we alluded to in the beginning of this article, and which are daily continuing to develop in a series of interrupted progress.—*Le Génie Civil.*

## The High Room Temperature.

Physicians tell us the proper temperature of a sick room should be from 65° to 70° F., and the heat should not go much below or much above these points. Abundance of fresh air sounds in the rule in all cases, except where the order of the physician prohibits the light. There is far more danger of the patient becoming overrated by close, foul air than there is from ventilation. English physicians insist that an open fire is a necessity to the proper ventilation of a sick room, and an eminent authority on this subject says: "I do not consider any room suitable for a patient to occupy during a prolonged illness where there is not an open fire burning on the hearth, in order to secure proper ventilation."

A light stove or a furnace register will not serve any such purpose. On the contrary, the stove throws out a dry heat which can only be partly counteracted by keeping boiling water on the stove. It does not solve in any way the problem of ventilation. The furnace register too often brings up a current of foul air from the cellar or the kitchen, into which the cold air box opens. Unfortunately it is quite the exception to have the cold air box open outdoors, as it should. Even where it so opens, the furnace register does not assist materially in ventilating the room. One of the best methods of removing odors is to take a shovel of burning coals, sprinkle it with coffee and pass it around the room. Where there is infectious disease a disinfecting solution should be obtained from a physician and used in the water in which the utensils of the room, the bedding, and clothing of the patient are washed.



THE TWIN STAIRCASE.

The security is complete, owing to the enveloping form of the box, which dispels all apprehension by its own weight, and to the person who is rising or descending an inviolable point of support. Moreover, an electric brake stops the apparatus at the top of a step—that is to say, at a height of about nine inches—in case

## STAIR BUILDERS' GOODS.

The design for a stair finish, shown in the illustration, appears in the 1892 catalogue of Messrs. S. K. Smith & Brother, 187 W. Seventh Street, St. Paul, Minn. The company are constantly getting out new designs, of which their catalogue presents a large number, and have the highest class of special machines and machine tools for getting out such work. Their goods are sent to every State and Territory between



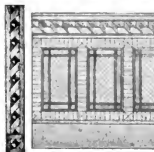
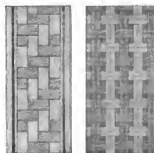
DESIGN FOR STAIR FINISH.

the Hudson River and the Pacific coast, including the Southern States, while they also have some trade in New England.

## ORNAMENTAL HARD WOOD FLOORS.

The value of this hard wood floors, made in a wide variety of ornamental designs and pleasing patterns, is undoubtedly becoming very popular. A portion of the rooms, at least, of every modern house, arranged in good taste to give the largest degree of comfort, should be provided with these hard wood floors, walls, wainscoting, or ceilings.

Our illustration represents a



few samples of this class of work, such as is produced in the finest grades by the Interior Hardwood Co., of Indianapolis, Ind. Such floors, when well laid, are permanent and improve with age, forming a part of the house decorations. They can be laid on old floors as well as new, the work being done by any good carpenter, and when down require less care than carpets, banishing moth and being decidedly more healthful. The strips and blocks are fastened together in slabs of convenient size, and nailed down with small-headed nails. They are finished with wax or shellac, heightening the natural beauty of the wood, which is well brought out by the contrasting colors of the different varieties employed, and the weaving effects produced by changing the direction of the grain in the perfectly made joints. Such floors are by no means new, having been in use for centuries in palaces and homes of the wealthy in Europe, but at no former period have they been so well made at so moderate cost as they can now be laid for.

This University of Paris was founded by King Philip II. about 1300.

## Large Winding Partition Doors.

A pair of doors of unusual size and novel construction have recently been placed in a church in Paterson, N. J. Filling an opening 30 ft. in width by 11 ft. in height, they can be rolled back at either side and concealed in pilasters 22 ft. by 24 ft. square. This ingenious method of disposing of a door or partition was invented and is now manufactured in Worcester, Mass., a city noted for the variety of its inventions and products. The doors are constructed of narrow strips of wood, securely hinged together by a series of concealed "table leaf joints," and when pushed back, wind about a steel spindle in the pilaster or door casing. The entire width of a room is thus left free when the doors are open, and when they are closed, what was, apparently, one large hall is divided into two separate apartments by handsome, substantial doors, as close fitting and as sound-proof as any door can be. This would seem to be a feature greatly to be desired in the construction of large assembly rooms and double parlors. The same principle is applicable to small doors and to inside blinds, which can be concealed in the side casings, thus not interfering with draperies or curtains.

## The "Alberene" Laundry Tub.

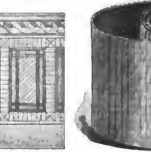
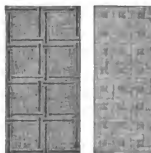
The value of a trade mark as a means of protecting not only the manufacturer, but the community at large, is well illustrated in the case of the Alberene Soapstone Company (recently at 4 and 6 Peck Slip, New York) with their "Alberene" door tub.

Their business was started at a time when there was in the minds of many a well founded prejudice against the use of soapstone for the manufacture of laundry tubs (well founded because of the poor grade of stone used and the lack of care in putting the tubs together). Recognizing the weakness of the soapstone then in use in the market, and confident of the real value of their own product, they introduced the most improved methods in the manufacture and handling of their goods, and by dint of energy and push have worked up a large trade in this one specialty.

At the start they adopted the trade mark "Alberene" which now appears plainly upon the face of every tub which leaves their hands, thus protecting not only the manufacturer, but the buying public. The company have recently found it necessary to move from their old quarters to a new and more commodious location at 386 Pearl Street, New York.

## House Heating and Ventilation.

The Abram Cox Store Company, Philadelphia, have recently issued a handsome quarto of 113 pages, in paper covers, on water and air circulation in heating and ventilating. Their special form of heating apparatus, known as the Novelty Circulator, is fully described, with illustrations, table of dimensions, prices,



## PATTERNS FOR PARQUETRY FLOORS AND BORDERS.

etc., and the book has an introductory chapter on circulation by John J. Huggan. The book also contains a large amount of technical information touching practical heating and ventilating which cannot fail to be of interest to the architect, builder, steam fitter and house owner.

## NOLAN'S HOT WATER AND STEAM HEATER.

The accompanying engraving shows a novel hot water and steam heater, invented and manufactured by Wm. E. Nolan, of No. 94 Quay Street, Brooklyn, N. Y., which the manufacturer claims has established a record for economy and durability. It is very simple in construction, consisting of a series of hollow annular conical castings, arranged one within the other, leaving an intervening flue space and exposing a very large amount of surface to the direct action of the fire. The



NOLAN'S HOT WATER AND STEAM HEATER.

outer annular section is longer than the other, forming a water leg and inclosing the fire pot from side to side. The grate is of the rocking and dumping pattern, and all the parts are arranged for simple and quick manipulation.

## The Crushing Resistance of Bricks.

The Department of Experimental Engineering, Sibley College, recently received from an Ithaca manufacturer four samples of brick to be tested. All the brick were tested entire and on edge, as they would be used for the purpose of paving. The sides were dressed to parallel planes on an

enough wheel, so that the bearing should be uniform over every part. A single layer of thick paper was placed between the surfaces of the brick and the testing machine.

The repressed brick exhibits the greatest crushing strength of any brick on record; it is also superior in strength to sandstone, and fully four-fifths as strong as granite. The tests of stone are usually made on cubes one or two inches on each edge, and such tests show a greater strength per square inch than would be the case if the form of the block was like that of the brick tested; so if the proper allowance for form should be made, there is little doubt but that the crushing strength of the best brick would compare favorably with the strongest granite. The best results from ordinary pressed brick usually show a strength from 6,000 to 10,000 pounds per square inch, so that the other bricks could be made for wearing qualities, but the brick exhibit, so far as can be determined by striking them with a hammer, sufficient toughness to make them a superior article of paving brick.

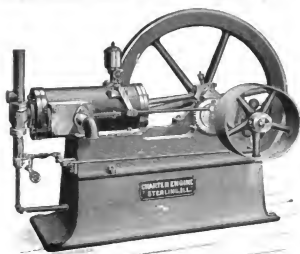


WATER TEST.

BOIL TEST.

## AN EXCELLENT MOTOR.

The accompanying illustration shows a motor which meets almost all conditions perfectly, and which is aptly called "the motor of the nineteenth century." It can be started at any time; uses its fuel in proportion to amount of work done; requires no attention; when stopped all expense ceases; gives perfect immunity from danger of fire and explosion; and operates at an expense of not to exceed ten cents per day to each indicated horse power. There are no ashes, gauges, or pumps to contend with; no smoke nuisance



THE CHARTER GAS ENGINE.

or extra insurance to complain of; no engineer to pay and watch for your life. It is independent, if desired, of gas works, and is being used in numberless contractors' and carpenters' shops. Many of these testify regarding it may be read by applying to the Charter Gas Engine Co., Lock Box 90, Sterling, Ill.

## A SUCCESSFUL HOT WATER HEATER.

The Detroit Heating and Lighting Company's Bolton Hot Water Heater is manufactured exclusively at Detroit, Mich. These heaters are made in all sizes, having capacity ranging from 400 to 10,000 feet of radiation, adapting them to the largest buildings as well as the smallest residences. Of the many advantages of these heaters, one in particular is the economy in fuel of the double and triple fire pot sizes. For ordinary winter weather when a heater's full capacity is unnecessary to maintain comfortable temperature these heaters are great fuel savers. A great saving in coal is accomplished by using only one-half or one-third of their fire pot capacity, while the remaining unused fire boxes are kept in reserve for the extreme weather

commonly experienced but for a few days in any winter.

From an inspection of the accompanying cut it will be seen there is no cast iron or brick wall partition between the heater's sections, as is the case in the "twinned" boilers of other makes. This construction is peculiar to the Bolton heater, and gives it the great advantage of passing the heat of only one fire box over the entire heating surface of practically two or three heaters, producing ample heat and resulting in a great saving of coal.

This operation would be impossible were the heaters built with partitions between sections or entirely separate, necessitating full fire box capacity to be always in use, even on the mildest winter day.

With only one fire box in use, by closing the direct draught damper above the fire and leaving open the one belonging to the unused fire box, the heat, in order to escape, must first pass over and among the pipes composing the heating surface of both parts of the boiler. (As indicated by arrows in cut.) As the water base and top for both fire pots are continuous, a fire in either side of the heater acts directly upon the entire body of water and not alone upon that in its individual section, as is the case with "twinned" heaters.

This company's heaters have been adopted for the Convent of the Visitation, St. Louis, Mo., requiring upward of 22,000 feet of radiation; the new Credit building at Newark, N. J.; the Weinstock-Lubin building, Sacramento, Cal.; the Elser office building, Atlanta, Ga.; the Tallmage & Boyer and Ochiltree buildings, Denver, Col., all very large structures, while the successfully heated schools, hospitals, churches, etc., in all parts of the country, too numerous to mention, further evince the heater's special adaptability for the very largest buildings.

## THE LAQUER TREE.

The juice of the laquer tree (*Rhus vernicefera*) is the natural varnish upon which depends the famous laquer work of the Japanese. Specimens of the tree were brought from Japan 16 years ago and planted in the Botanical Garden at Frankfurt, where they have flourished and have yielded seeds from which thirty young trees have sprung. This place now has thirty-four healthy trees, 30 feet high and 2 feet in circumference near the ground. To determine whether the juice is affected by its changed conditions, Prof. Rein has sent samples to Japanese artists for trial, and is having comparative analyses made by eminent chemists. If the reports are favorable, it is expected that the laquer tree will be quite extensively planted in Germany, and that Europeans will be instructed in the art of laquering wood by some skilful workmen from Japan.

## A SELF-RETAINING DUMB WAITER.

The illustration represents a dumb waiter which is self-retaining without brake ropes, clamps, or other fastening, and will not slip. This end is attained by the use of a novel patented side cam and pawl arrangement, which is extremely simple in construction, and not liable to get out of order, while possessing ample strength. Waiters in which this improvement



THE "PARAGON" DUMB WAITER.

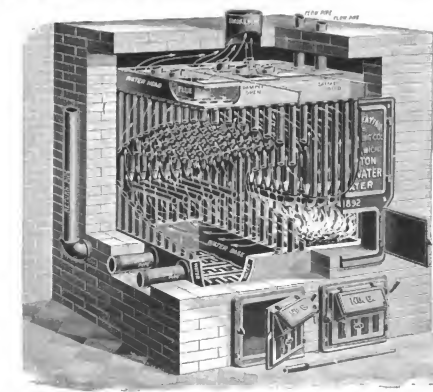
has been adopted have been in practical use now for about five years, some being in the best of residences and others in flats, tenements, and factories, and they are said to give entire satisfaction in all cases. The water will not move down under any increase of the load, and is accessible from all floors at all times, while it is easy, noiseless, and rapid in its working. It is manufactured by F. S. Hutchinson & Co., Sixth Street and West Avenue, Long Island City, N. Y.

## ARCHITECTURAL WOOD TURNING.

The accompanying cuts show some of the new patterns of newels and balusters which have lately been brought out by Adam Dickey, of 43 Bristol Street, Boston, Mass. Mr. Dickey makes a specialty of work for architects' designs, and has on hand at all times and ready for immediate delivery a large stock of solid and built-up newels and stair rails of all dimensions. He issues an illustrated catalogue, which will interest all contemplating building.



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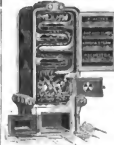
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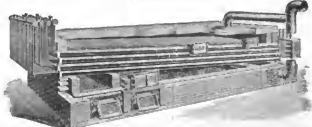
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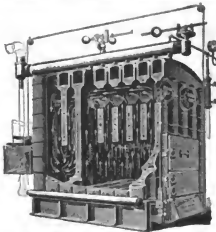
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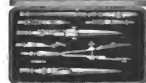
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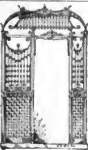
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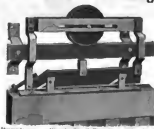
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the old wall of Jerusalem? Has any analysis of Egypt-  
ian mummies determined whether anything more  
than common salt was used in mummifying process?  
If so, what? A. We can only add that it was not old saw

(Continued on page vi.)

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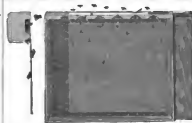
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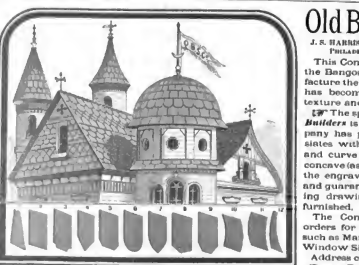
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(Continued from page iv.)

that lightning never strikes twice in the same place, yet in this case it does so with almost natural frequency. The great stone with about 1,000 tons. Captain East's ship railway was to carry several times this weight across the isthmus. The Union Eastern was the greatest block that modern engineers ever stumbled on, broke with the same blocks are pygmies. There were probably other precautions than will sell on the moment. The dry air of Egypt was the principal preservative.

(3) E. D. W. says: A fence is to be built over a half mile hill. Another over a straight line being the exact diameter of the above half mile. The specification calls for posts placed 2 feet apart. I want just to require the greatest number of posts. As if the picture are placed vertically, it will require the same number of posts for both jobs. Not so with the rails, as is self-evident.

(4) H. R. writes: I am making some lime enamel for enameling iron ware, made of sand, borax, potash, and cobalt oxide. When ground into a pulp there is a white mass on the top of the enamel. (Can you let me know the cause of it? Can you give me a receipt for lime enamel?) In three any book published on the manufacturing of glass enamel. A. From the mixture, pour while fused into water and repeat it. This will give it greater uniformity and avoid the cause. The "Scientific American Encyclopedia of Enamels," \$5 by mail, gives a great deal of information on this subject.

(5) J. H. J. C. writes: How to aerate if water that flows and is made in galvanized iron pipes contains a solution of lime. A. Concentrate by evaporation, add a slight excess sodium hyposulfite, filter if necessary, and pass re-aerated hydrogen through it. A white precipitate indicates the presence of lime.

(6) M. O. R. says: I am building nearly two miles of fence. Oak pickets by 1/2 inches 1 foot long, woven in live poles of wire, Washburn & Moen guaranteeing process, in which the wire is fairly soaked through the iron. Having some doubts as to durability of the oak pickets, I wish to apply some preservative which will not injure the wire, but preserve the wood. Would the Bordeaux mixture (solution of copper in a whitewash of lime)? Is the copper salt injurious, or the lime, or both? Will you suggest something stronger? A. There is no objection to the Bordeaux wash. Another way is to use 2 pounds of sulphate of zinc and 1 pound salt in 30 pounds dry lime, and color if desired with yellow ochre, or any cheap mineral paint. To give the above a strong blue a half pound of glue may be added, dissolved separately. You may also add a little glue to the Bordeaux mixture to advantage. If appearance is no object, cut tar in the best preservative. The whitewashes are not injurious in brand or size.

(7) N. C. H. asks: I will you please explain to me the philosophy of the steel? Why is it the smallest, does not alloy? A. The presentation of

(Continued on page vi.)

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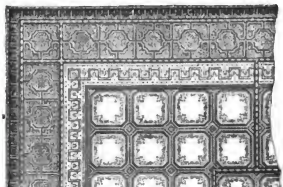
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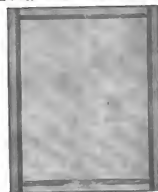
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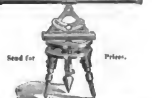
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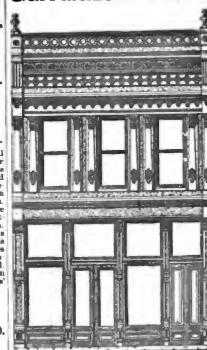


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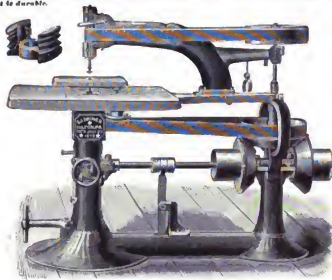


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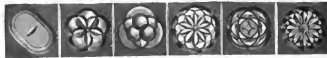


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(Continued from page vii)

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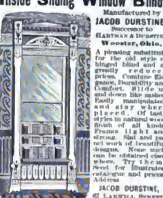
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4164, 4176, 4188, 4200, 4212, 4224, 4236, 4248, 4260, 4272, 4284, 4296, 4308, 4320, 4332, 4344, 4356, 4368, 4380, 4392, 4404, 4416, 4428, 4440, 4452, 4464, 4476, 4488, 4500, 4512, 4524, 4536, 4548, 4560, 4572, 4584, 4596, 4608, 4620, 4632, 4644, 4656, 4668, 4680, 4692, 4704, 4716, 4728, 4740, 4752, 4764, 4776, 4788, 4800, 4812, 4824, 4836, 4848, 4860, 4872, 4884, 4896, 4908, 4920, 4932, 4944, 4956, 4968, 4980, 4992, 5004, 5016, 5028, 5040, 5052, 5064, 5076, 5088, 5100, 5112, 5124, 5136, 5148, 5160, 5172, 5184, 5196, 5208, 5220, 5232, 5244, 5256, 5268, 5280, 5292, 5304, 5316, 5328, 5340, 5352, 5364, 5376, 5388, 5400, 5412, 5424, 5436, 5448, 5460, 5472, 5484, 5496, 5508, 5520, 5532, 5544, 5556, 5568, 5580, 5592, 5604, 5616, 5628, 5640, 5652, 5664, 5676, 5688, 5700, 5712, 5724, 5736, 5748, 5760, 5772, 5784, 5796, 5808, 5820, 5832, 5844, 5856, 5868, 5880, 5892, 5904, 5916, 5928, 5940, 5952, 5964, 5976, 5988, 6000, 6012, 6024, 6036, 6048, 6060, 6072, 6084, 6096, 6108, 6120, 6132, 6144, 6156, 6168, 6180, 6192, 6204, 6216, 6228, 6240, 6252, 6264, 6276, 6288, 6300, 6312, 6324, 6336, 6348, 6360, 6372, 6384, 6396, 6408, 6420, 6432, 6444, 6456, 6468, 6480, 6492, 6504, 6516, 6528, 6540, 6552, 6564, 6576, 6588, 6600, 6612, 6624, 6636, 6648, 6660, 6672, 6684, 6696, 6708, 6720, 6732, 6744, 6756, 6768, 6780, 6792, 6804, 6816, 6828, 6840, 6852, 6864, 6876, 6888, 6900, 6912, 6924, 6936, 6948, 6960, 6972, 6984, 6996, 7008, 7020, 7032, 7044, 7056, 7068, 7080, 7092, 7104, 7116, 7128, 7140, 7152, 7164, 7176, 7188, 7200, 7212, 7224, 7236, 7248, 7260, 7272, 7284, 7296, 7308, 7320, 7332, 7344, 7356, 7368, 7380, 7392, 7404, 7416, 7428, 7440, 7452, 7464, 7476, 7488, 7500, 7512, 7524, 7536, 7548, 7560, 7572, 7584, 7596, 7608, 7620, 7632, 7644, 7656, 7668, 7680, 7692, 7704, 7716, 7728, 7740, 7752, 7764, 7776, 7788, 7800, 7812, 7824, 7836, 7848, 7860, 7872, 7884, 7896, 7908, 7920, 7932, 7944, 7956, 7968, 7980, 7992, 8004, 8016, 8028, 8040, 8052, 8064, 8076, 8088, 8100, 8112, 8124, 8136, 8148, 8160, 8172, 8184, 8196, 8208, 8220, 8232, 8244, 8256, 8268, 8280, 8292, 8304, 8316, 8328, 8340, 8352, 8364, 8376, 8388, 8400, 8412, 8424, 8436, 8448, 8460, 8472, 8484, 8496, 8508, 8520, 8532, 8544, 8556, 8568, 8580, 8592, 8604, 8616, 8628, 8640, 8652, 8664, 8676, 8688, 8700, 8712, 8724, 8736, 8748, 8760, 8772, 8784, 8796, 8808, 8820, 8832, 8844, 8856, 8868, 8880, 8892, 8904, 8916, 8928, 8940, 8952, 8964, 8976, 8988, 9000, 9012, 9024, 9036, 9048, 9060, 9072, 9084, 9096, 9108, 9120, 9132, 9144, 9156, 9168, 9180, 9192, 9204, 9216, 9228, 9240, 9252, 9264, 9276, 9288, 9300, 9312, 9324, 9336, 9348, 9360, 9372, 9384, 9396, 9408, 9420, 9432, 9444, 9456, 9468, 9480, 9492, 9504, 9516, 9528, 9540, 9552, 9564, 9576, 9588, 9600, 9612, 9624, 9636, 9648, 9660, 9672, 9684, 9696, 9708, 9720, 9732, 9744, 9756, 9768, 9780, 9792, 9804, 9816, 9828, 9840, 9852, 9864, 9876, 9888, 9900, 9912, 9924, 9936, 9948, 9960, 9972, 9984, 9996, 10008, 10020, 10032, 10044, 10056, 10068, 10080, 10092, 10104, 10116, 10128, 10140, 10152, 10164, 10176, 10188, 10200, 10212, 10224, 10236, 10248, 10260, 10272, 10284, 10296, 10308, 10320, 10332, 10344, 10356, 10368, 10380, 10392, 10404, 10416, 10428, 10440, 10452, 10464, 10476, 10488, 10500, 10512, 10524, 10536, 10548, 10560, 10572, 10584, 10596, 10608, 10620, 10632, 10644, 10656, 10668, 10680, 10692, 10704, 10716, 10728, 10740, 10752, 10764, 10776, 10788, 10800, 10812, 10824, 10836, 10848, 10860, 10872, 10884, 10896, 10908, 10920, 10932, 10944, 10956, 10968, 10980, 10992, 11004, 11016, 11028, 11040, 11052, 11064, 11076, 11088, 11100, 11112, 11124, 11136, 11148, 11160, 11172, 11184, 11196, 11208, 11220, 11232, 11244, 11256, 11268, 11280, 11292, 11304, 11316, 11328, 11340, 11352, 11364, 11376, 11388, 11400, 11412, 11424, 11436, 11448, 11460, 11472, 11484, 11496, 11508, 11520, 11532, 11544, 11556, 11568, 11580, 11592, 11604, 11616, 11628, 11640, 11652, 11664, 11676, 11688, 11700, 11712, 11724, 11736, 11748, 11760, 11772, 11784, 11796, 11808, 11820, 11832, 11844, 11856, 11868, 11880, 11892, 11904, 11916, 11928, 11940, 11952, 11964, 11976, 11988, 12000, 12012, 12024, 12036, 12048, 12060, 12072, 12084, 12096, 12108, 12120, 12132, 12144, 12156, 12168, 12180, 12192, 12204, 12216, 12228, 12240, 12252, 12264, 12276, 12288, 12300, 12312, 12324, 12336, 12348, 12360, 12372, 12384, 12396, 12408, 12420, 12432, 12444, 12456, 12468, 12480, 12492, 12504, 12516, 12528, 12540, 12552, 12564, 12576, 12588, 12600, 12612, 12624, 12636, 12648, 12660, 12672, 12684, 12696, 12708, 12720, 12732, 12744, 12756, 12768, 12780, 12792, 12804, 12816, 12828, 12840, 12852, 12864, 12876, 12888, 12900, 12912, 12924, 12936, 12948, 12960, 12972, 12984, 12996, 13008, 13020, 13032, 13044, 13056, 13068, 13080, 13092, 13104, 13116, 13128, 13140, 13152, 13164, 13176, 13188, 13200, 13212, 13224, 13236, 13248, 13260, 13272, 13284, 13296, 13308, 13320, 13332, 13344, 13356, 13368, 13380, 13392, 13404, 13416, 13428, 13440, 13452, 13464, 13476, 13488, 13500, 13512, 13524, 13536, 13548, 13560, 13572, 13584, 13596, 13608, 13620, 13632, 13644, 13656, 13668, 13680, 13692, 13704, 13716, 13728, 13740, 13752, 13764, 13776, 13788, 13800, 13812, 13824, 13836, 13848, 13860, 13872, 13884, 13896, 13908, 13920, 13932, 13944, 13956, 13968, 13980, 13992, 14004, 14016, 14028, 14040, 14052, 14064, 14076, 14088, 14100, 14112, 14124, 14136, 14148, 14160, 14172, 14184, 14196, 14208, 14220, 14232, 14244, 14256, 14268, 14280, 14292, 14304, 14316, 14328, 14340, 14352, 14364, 14376, 14388, 14400, 14412, 14424, 14436, 14448, 14460, 14472, 14484, 14496, 14508, 14520, 14532, 14544, 14556, 14568, 14580, 14592, 14604, 14616, 14628, 14640, 14652, 14664, 14676, 14688, 14700, 14712, 14724, 14736, 14748, 14760, 14772, 14784, 14796, 14808, 14820, 14832, 14844, 14856, 14868, 14880, 14892, 14904, 14916, 14928, 14940, 14952, 14964, 14976, 14988, 15000, 15012, 15024, 15036, 15048, 15060, 15072, 15084, 15096, 15108, 15120, 15132, 15144, 15156, 15168, 15180, 15192, 15204, 15216, 15228, 15240, 15252, 15264, 15276, 15288, 15300, 15312, 15324, 15336, 15348, 15360, 15372, 15384, 15396, 15408, 15420, 15432, 15444, 15456, 15468, 15480, 15492, 15504, 15516, 15528, 15540, 15552, 15564, 15576, 15588, 15600, 15612, 15624, 15636, 15648, 15660, 15672, 15684, 15696, 15708, 15720, 15732, 15744, 15756, 15768, 15780, 15792, 15804, 15816, 15828, 15840, 15852, 15864, 15876, 15888, 15900, 15912, 15924, 15936, 15948, 15960, 15972, 15984, 15996, 16008, 16020, 16032, 16044, 16056, 16068, 16080, 16092, 16104, 16116, 16128, 16140, 16152, 16164, 16176, 16188, 16200, 16212, 16224, 16236, 16248, 16260, 16272, 16284, 16296, 16308, 16320, 16332, 16344, 16356, 16368, 16380, 16392, 16404, 16416, 16428, 16440, 16452, 16464, 16476, 16488, 16500, 16512, 16524, 16536, 16548, 16560, 16572, 16584, 16596, 16608, 16620, 16632, 16644, 16656, 16668, 16680, 16692, 16704, 16716, 16728, 16740, 16752, 16764, 16776, 16788, 16800, 16812, 16824, 16836, 16848, 16860, 16872, 16884, 16896, 16908, 16920, 16932, 16944, 16956, 16968, 16980, 16992, 17004, 17016, 17028, 17040, 17052, 17064, 17076, 17088, 17100, 17112, 17124, 17136, 17148, 17160, 17172, 17184, 17196, 17208, 17220, 17232, 17244, 17256, 17268, 17280, 17292, 17304, 17316, 17328, 17340, 17352, 17364, 17376, 17388, 17400, 17412, 17424, 17436, 17448, 17460, 17472, 17484, 17496, 17508, 17520, 17532, 17544, 17556, 17568, 17580, 17592, 17604, 17616, 17628, 17640, 17652, 17664, 17676, 17688, 17700, 17712, 17724, 17736, 17748, 17760, 17772, 17784, 17796, 17808, 17820, 17832, 17844, 17856, 17868, 17880, 17892, 17904, 17916, 17928, 17940, 17952, 17964, 17976, 17988, 18000, 18012, 18024, 18036, 18048, 18060, 18072, 18084, 18096, 18108, 18120, 18132, 18144, 18156, 18168, 18180, 18192, 18204, 18216, 18228, 18240, 18252, 18264, 18276, 18288, 18300, 18312, 18324, 18336, 18348, 18360, 18372, 18384, 18396, 18408, 18420, 18432, 18444, 18456, 18468, 18480, 18492, 18504, 18516, 18528, 18540, 18552, 18564, 18576, 18588, 18600, 18612, 18624, 18636, 18648, 18660, 18672, 18684, 18696, 18708, 18720, 18732, 18744, 18756, 18768, 18780, 18792, 18804, 18816, 18828, 18840, 18852, 18864, 18876, 18888, 18900, 18912, 18924, 18936, 18948, 18960, 18972, 18984, 18996, 19008, 19020, 19032, 19044, 19056, 19068, 19080, 19092, 19104, 19116, 19128, 19140, 19152, 19164, 19176, 19188, 19200, 19212, 19224, 19236, 19248, 19260, 19272, 19284, 19296, 19308, 19320, 19332, 19344, 19356, 19368, 19380, 19392, 19404, 19416, 19428, 19440, 19452, 19464, 19476, 19488, 19500, 19512, 19524, 19536, 19548, 19560, 19572, 19584, 19596, 19608, 19620, 19632, 19644, 19656, 19668, 19680, 19692, 19704, 19716, 19728, 19740, 19752, 19764, 19776, 19788, 19800, 19812, 19824, 19836, 19848, 19860, 19872, 19884, 19896, 19908, 19920, 19932, 19944, 19956, 19968, 19980, 19992, 20004, 20016, 20028, 20040, 20052, 20064, 20076, 20088, 20100, 20112, 20124, 20136, 20148, 20160, 20172, 20184, 20196, 20208, 20220, 20232, 20244, 20256, 20268, 20280, 20292, 20304, 20316, 20328, 20340, 20352, 20364, 20376, 2



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418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 770, 772, 774, 776, 778, 780, 782, 784, 786, 788, 790, 792, 794, 796, 798, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000, 1002, 1004, 1006, 1008, 1010, 1012, 1014, 1016, 1018, 1020, 1022, 1024, 1026, 1028, 1030, 1032, 1034, 1036, 1038, 1040, 1042, 1044, 1046, 1048, 1050, 1052, 1054, 1056, 1058, 1060, 1062, 1064, 1066, 1068, 1070, 1072, 1074, 1076, 1078, 1080, 1082, 1084, 1086, 1088, 1090, 1092, 1094, 1096, 1098, 1100, 1102, 1104, 1106, 1108, 1110, 1112, 1114, 1116, 1118, 1120, 1122, 1124, 1126, 1128, 1130, 1132, 1134, 1136, 1138, 1140, 1142, 1144, 1146, 1148, 1150, 1152, 1154, 1156, 1158, 1160, 1162, 1164, 1166, 1168, 1170, 1172, 1174, 1176, 1178, 1180, 1182, 1184, 1186, 1188, 1190, 1192, 1194, 1196, 1198, 1200, 1202, 1204, 1206, 1208, 1210, 1212, 1214, 1216, 1218, 1220, 1222, 1224, 1226, 1228, 1230, 1232, 1234, 1236, 1238, 1240, 1242, 1244, 1246, 1248, 1250, 1252, 1254, 1256, 1258, 1260, 1262, 1264, 1266, 1268, 1270, 1272, 1274, 1276, 1278, 1280, 1282, 1284, 1286, 1288, 1290, 1292, 1294, 1296, 1298, 1300, 1302, 1304, 1306, 1308, 1310, 1312, 1314, 1316, 1318, 1320, 1322, 1324, 1326, 1328, 1330, 1332, 1334, 1336, 1338, 1340, 1342, 1344, 1346, 1348, 1350, 1352, 1354, 1356, 1358, 1360, 1362, 1364, 1366, 1368, 1370, 1372, 1374, 1376, 1378, 1380, 1382, 1384, 1386, 1388, 1390, 1392, 1394, 1396, 1398, 1400, 1402, 1404, 1406, 1408, 1410, 1412, 1414, 1416, 1418, 1420, 1422, 1424, 1426, 1428, 1430, 1432, 1434, 1436, 1438, 1440, 1442, 1444, 1446, 1448, 1450, 1452, 1454, 1456, 1458, 1460, 1462, 1464, 1466, 1468, 1470, 1472, 1474, 1476, 1478, 1480, 1482, 1484, 1486, 1488, 1490, 1492, 1494, 1496, 1498, 1500, 1502, 1504, 1506, 1508, 1510, 1512, 1514, 1516, 1518, 1520, 1522, 1524, 1526, 1528, 1530, 1532, 1534, 1536, 1538, 1540, 1542, 1544, 1546, 1548, 1550, 1552, 1554, 1556, 1558, 1560, 1562, 1564, 1566, 1568, 1570, 1572, 1574, 1576, 1578, 1580, 1582, 1584, 1586, 1588, 1590, 1592, 1594, 1596, 1598, 1600, 1602, 1604, 1606, 1608, 1610, 1612, 1614, 1616, 1618, 1620, 1622, 1624, 1626, 1628, 1630, 1632, 1634, 1636, 1638, 1640, 1642, 1644, 1646, 1648, 1650, 1652, 1654, 1656, 1658, 1660, 1662, 1664, 1666, 1668, 1670, 1672, 1674, 1676, 1678, 1680, 1682, 1684, 1686, 1688, 1690, 1692, 1694, 1696, 1698, 1700, 1702, 1704, 1706, 1708, 1710, 1712, 1714, 1716, 1718, 1720, 1722, 1724, 1726, 1728, 1730, 1732, 1734, 1736, 1738, 1740, 1742, 1744, 1746, 1748, 1750, 1752, 1754, 1756, 1758, 1760, 1762, 1764, 1766, 1768, 1770, 1772, 1774, 1776, 1778, 1780, 1782, 1784, 1786, 1788, 1790, 1792, 1794, 1796, 1798, 1800, 1802, 1804, 1806, 1808, 1810, 1812, 1814, 1816, 1818, 1820, 1822, 1824, 1826, 1828, 1830, 1832, 1834, 1836, 1838, 1840, 1842, 1844, 1846, 1848, 1850, 1852, 1854, 1856, 1858, 1860, 1862, 1864, 1866, 1868, 1870, 1872, 1874, 1876, 1878, 1880, 1882, 1884, 1886, 1888, 1890, 1892, 1894, 1896, 1898, 1900, 1902, 1904, 1906, 1908, 1910, 1912, 1914, 1916, 1918, 1920, 1922, 1924, 1926, 1928, 1930, 1932, 1934, 1936, 1938, 1940, 1942, 1944, 1946, 1948, 1950, 1952, 1954, 1956, 1958, 1960, 1962, 1964, 1966, 1968, 1970, 1972, 1974, 1976, 1978, 1980, 1982, 1984, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2024, 2026, 2028, 2030, 2032, 2034, 2036, 2038, 2040, 2042, 2044, 2046, 2048, 2050, 2052, 2054, 2056, 2058, 2060, 2062, 2064, 2066, 2068, 2070, 2072, 2074, 2076, 2078, 2080, 2082, 2084, 2086, 2088, 2090, 2092, 2094, 2096, 2098, 2100, 2102, 2104, 2106, 2108, 2110, 2112, 2114, 2116, 2118, 2120, 2122, 2124, 2126, 2128, 2130, 2132, 2134, 2136, 2138, 2140, 2142, 2144, 2146, 2148, 2150, 2152, 2154, 2156, 2158, 2160, 2162, 2164, 2166, 2168, 2170, 2172, 2174, 2176, 2178, 2180, 2182, 2184, 2186, 2188, 2190, 2192, 2194, 2196, 2198, 2200, 2202, 2204, 2206, 2208, 2210, 2212, 2214, 2216, 2218, 2220, 2222, 2224, 2226, 2228, 2230, 2232, 2234, 2236, 2238, 2240, 2242, 2244, 2246, 2248, 2250, 2252, 2254, 2256, 2258, 2260, 2262, 2264, 2266, 2268, 2270, 2272, 2274, 2276, 2278, 2280, 2282, 2284, 2286, 2288, 2290, 2292, 2294, 2296, 2298, 2300, 2302, 2304, 2306, 2308, 2310, 2312, 2314, 2316, 2318, 2320, 2322, 2324, 2326, 2328, 2330, 2332, 2334, 2336, 2338, 2340, 2342, 2344, 2346, 2348, 2350, 2352, 2354, 2356, 2358, 2360, 2362, 2364, 2366, 2368, 2370, 2372, 2374, 2376, 2378, 2380, 2382, 2384, 2386, 2388, 2390, 2392, 2394, 2396, 2398, 2400, 2402, 2404, 2406, 2408, 2410, 2412, 2414, 2416, 2418, 2420, 2422, 2424, 2426, 2428, 2430, 2432, 2434, 2436, 2438, 2440, 2442, 2444, 2446, 2448, 2450, 2452, 2454, 2456, 2458, 2460, 2462, 2464, 2466, 2468, 2470, 2472, 2474, 2476, 2478, 2480, 2482, 2484, 2486, 2488, 2490, 2492, 2494, 2496, 2498, 2500, 2502, 2504, 2506, 2508, 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2842, 2844, 2846, 2848, 2850, 2852, 2854, 2856, 2858, 2860, 2862, 2864, 2866, 2868, 2870, 2872, 2874, 2876, 2878, 2880, 2882, 2884, 2886, 2888, 2890, 2892, 2894, 2896, 2898, 2900, 2902, 2904, 2906, 2908, 2910, 2912, 2914, 2916, 2918, 2920, 2922, 2924, 2926, 2928, 2930, 2932, 2934, 2936, 2938, 2940, 2942, 2944, 2946, 2948, 2950, 2952, 2954, 2956, 2958, 2960, 2962, 2964, 2966, 2968, 2970, 2972, 2974, 2976, 2978, 2980, 2982, 2984, 2986, 2988, 2990, 2992, 2994, 2996, 2998, 3000, 3002, 3004, 3006, 3008, 3010, 3012, 3014, 3016, 3018, 3020, 3022, 3024, 3026, 3028, 3030, 3032, 3034, 3036, 3038, 3040, 3042, 3044, 3046, 3048, 3050, 3052, 3054, 3056, 3058, 3060, 3062, 3064, 3066, 3068, 3070, 3072, 3074, 3076, 3078, 3080, 3082, 3084, 3086, 3088, 3090, 3092, 3094, 3096, 3098, 3100, 3102, 3104, 3106, 3108, 3110, 3112, 3114, 3116, 3118, 3120, 3122, 3124, 3126, 3128, 3130, 3132, 3134, 3136, 3138, 3140, 3142, 3144, 3146, 3148, 3150, 3152, 3154, 3156, 3158, 3160, 3162, 3164, 3166, 3168, 3170, 3172, 3174, 3176, 3178, 3180, 3182, 3184, 3186, 3188, 3190, 3192, 3194, 3196, 3198, 3200, 3202, 3204, 3206, 3208, 3210, 3212, 3214, 3216, 3218, 3220, 3222, 3224, 3226, 3228, 3230, 3232, 3234, 3236, 3238, 3240, 3242, 3244, 3246, 3248, 3250, 3252, 3254, 3256, 3258, 3260, 3262, 3264, 3266, 3268, 3270, 3272, 3274, 3276, 3278, 3280, 3282, 3284, 3286, 3288, 3290, 3292, 3294, 3296, 3298, 3300, 3302, 3304, 3306, 3308, 3310, 3312, 3314, 3316, 3318, 3320, 3322, 3324, 3326, 3328, 3330, 3332, 3334, 3336, 3338, 3340, 3342, 3344, 3346, 3348, 3350, 3352, 3354, 3356, 3358, 3360, 3362, 3364, 3366, 3368, 3370, 3372, 3374, 3376, 3378, 3380, 3382, 3384, 3386, 3388, 3390, 3392, 3394, 3396, 3398, 3400, 3402, 3404, 3406, 3408, 3410, 3412, 3414, 3416, 3418, 3420, 3422, 3424, 3426, 3428, 3430, 3432, 3434, 3436, 3438, 3440, 3442, 3444, 3446, 3448, 3450, 3452, 3454, 3456, 3458, 3460, 3462, 3464, 3466, 3468, 3470, 3472, 3474, 3476, 3478, 3480, 3482, 3484, 3486, 3488, 3490, 3492, 3494, 3496, 3498, 3500, 3502, 3504, 3506, 3508, 3510, 3512, 3514, 3516, 3518, 3520, 3522, 3524, 3526, 3528, 3530, 3532, 3534, 3536, 3538, 3540, 3542, 3544, 3546, 3548, 3550, 3552, 3554, 3556, 3558, 3560, 3562, 3564, 3566, 3568, 3570, 3572, 3574, 3576, 3578, 3580, 3582, 3584, 3586, 3588, 3590, 3592, 3594, 3596, 3598, 3600, 3602, 3604, 3606, 3608, 3610, 3612, 3614, 3616, 3618, 3620, 3622, 3624, 3626, 3628, 3630, 3632, 3634, 3636, 3638, 3640, 3642, 3644, 3646, 3648, 3650, 3652, 3654, 3656, 3658, 3660, 3662, 3664, 3666, 3668, 3670, 3672, 3674, 3676, 3678, 3680, 3682, 3684, 3686, 3688, 3690, 3692, 3694, 3696, 3698, 3700, 3702, 3704, 3706, 3708, 3710, 3712, 3714, 3716, 3718, 3720, 3722, 3724, 3726, 3728, 3730, 3732, 3734, 3736, 3738, 3740, 3742, 3744, 3746, 3748, 3750, 3752, 3754, 3756, 3758, 3760, 3762, 3764, 3766, 3768, 3770, 3772, 3774, 3776, 3778, 3780, 3782, 3784, 3786, 3788, 3790, 3792, 3794, 3796, 3798, 3800, 3802, 3804, 3806, 3808, 3810, 3812, 3814, 3816, 3818, 3820, 3822, 3824, 3826, 3828, 3830, 3832, 3834, 3836, 3838, 3840, 3842, 3844, 3846, 3848, 3850, 3852, 3854, 3856, 3858, 3860, 3862, 3864, 3866, 3868, 3870, 3872, 3874, 3876, 3878, 3880, 3882, 3884, 3886, 3888, 3890, 3892, 3894, 3896, 3898, 3900, 3902, 3904, 3906, 3908, 3910, 3912, 3914, 3916, 3918, 3920, 3922, 3924, 3926, 3928, 3930, 3932, 3934, 3936, 3938, 3940, 3942, 3944, 3946, 3948, 3950, 3952, 3954, 3956, 3958, 3960, 3962, 3964, 3966, 3968, 3970, 3972, 3974, 3976, 3978, 3980, 3982, 3984, 3986, 3988, 3990, 3992, 3994, 3996, 3998, 4000, 4002, 4004, 4006, 4008, 4010, 4012, 4014, 4016, 4018, 4020, 4022, 4024, 4026, 4028, 4030, 4032, 4034, 4036, 4038, 4040, 4042, 4044, 4046, 4048, 4050, 4052, 4054, 4056, 4058,

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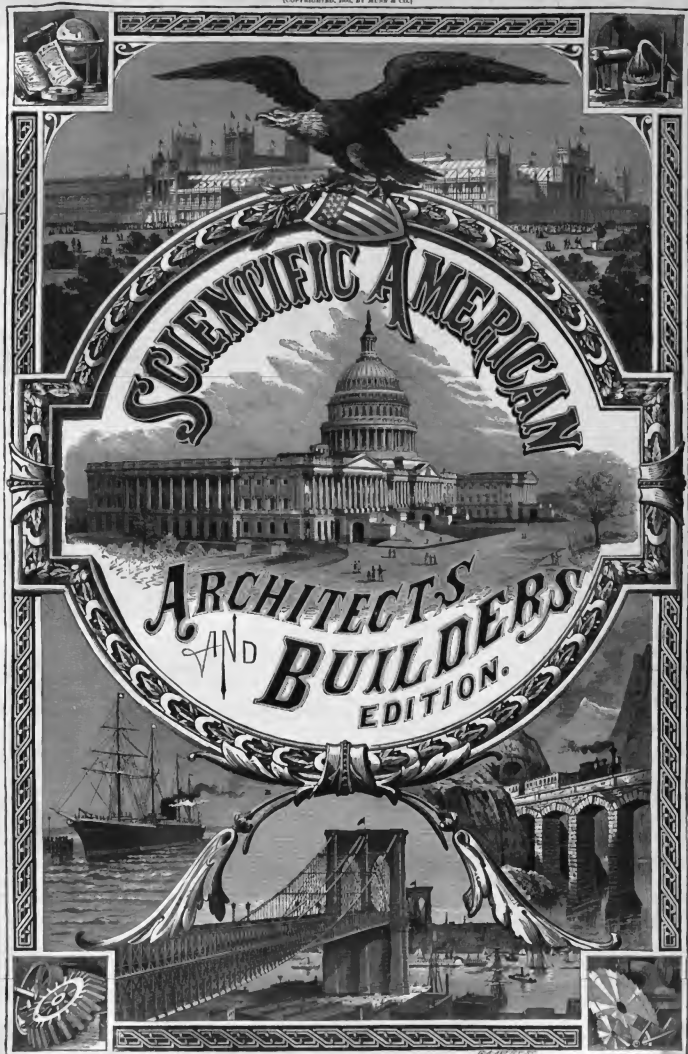
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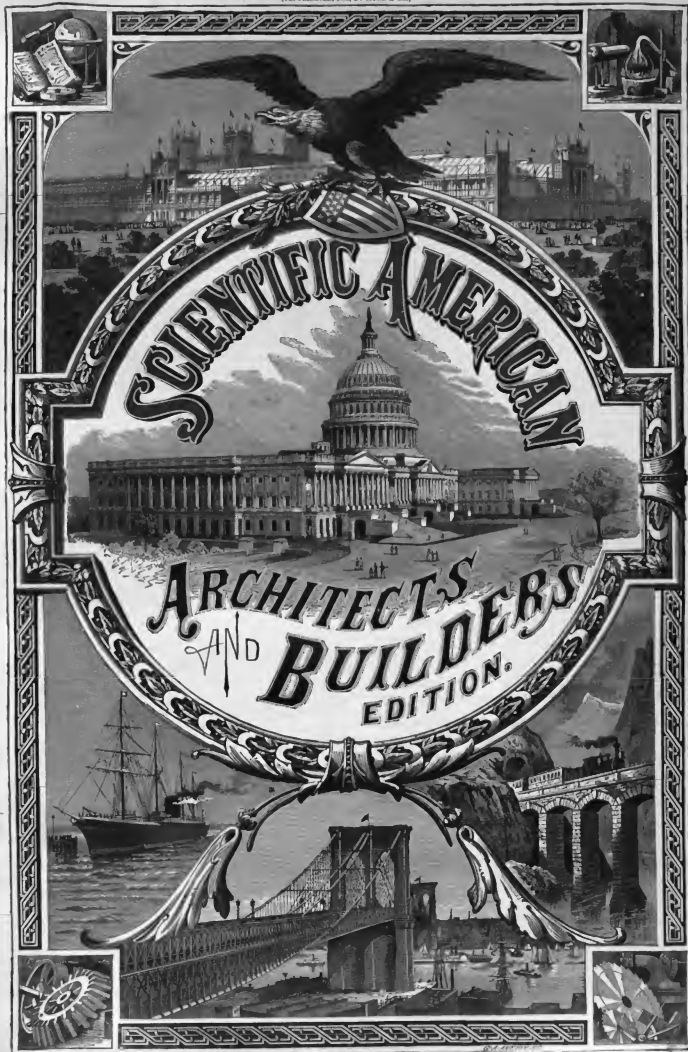


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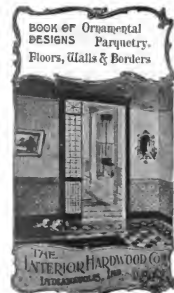
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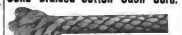
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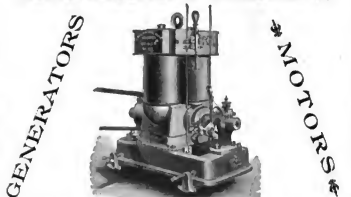


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NEW YORK, AUGUST, 1892.

Single Copies, 25 Cents.

No. 1.



THE TOMB OF WELLINGTON, ST. PAUL'S CATHEDRAL, LONDON.—DESIGNED BY ALFRED STEPHENS. (See page 16.)



The interior arrangement is excellent. It provides a large carriage room, 22 x 20 ft., and a stable well lighted and ventilated, containing two stalls furnished with the usual iron fixtures. The carriage room throughout is trimmed and celled with narrow hewed Douglas pine, finished natural with hard oil. Carriage room is provided with a glass harness case. Stairs from stable lead to Mr. John's bedroom and hay loft. Cost \$700 complete. Mr. John Calvin Stevens architect, Portland, Maine.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

#### SCARLET RUNNER BEANS.

It is seldom advisable to sow or plant these in the open air earlier than the beginning of May. They may, however, with the view to accelerating the development of the plants and thus securing an earlier production of pods, be sown in seed boxes or set pans under glass in gentle warmth, and be finally planted out in a well enriched soil as soon as all danger from late frosts is over. Some sow or plant in trenches prepared specially for these intended for celery. These trenches should not be less than 5 ft. or 6 ft. apart, and the plants require tall stakes to support them. In places, however, where ordinary stakes, such as used for tall varieties of peas, are difficult to obtain, poles may be substituted for them, even of wood, provided they will be found to be in all respects equally suitable for the purpose, and with care will last for ten or more years. The poles should be some 8 ft. long, so that when, let a sufficient depth into the soil to give stability they may stand some 6 ft. or 7 ft. high, and the same may be strengthened and kept in position by means of a horizontal rod fastened to each pole, which should be placed at a distance of 18 in. or 3 ft. apart. The plants will thus form, if desired, an archway (see illustration), an excellent screen or shelter to conceal any unsightly object, or they may be made to clothe the front of a rough wall or wooden fence of any kind, and with the assistance of a few strings they will readily adhere to them, and will at the same time furnish an abundant supply of delicious pods. Runner beans may also, though possibly less successfully, be grown in a dwarf form—that is, without the aid of stakes of any kind, and when this is attempted, it is necessary to frequently secure the strongest shoots. The surface of the soil should in such cases be well mulched with stable yard litter, so as to prevent the pods from becoming gritty by contact with the soil. Runner beans have an advantage over kidney beans, inasmuch as they bear continuously to the end of the season, or until the plants are cut down by autumnal frosts. Many, too, prefer the flavor of runners to that of the dwarf sorts. The scarlet runner may justly be considered an ornamental as well as a useful plant; and in addition to the common variety with its scarlet flowers, there are also white flowering sorts, as well as the variety known as the painted lady, or York and Lancaster, whose blooms are very pretty, and in color scarlet and white. There are also varieties of very large pods, such as champion and giant white runners.—*The Gardener.*

#### A SUMMER COTTAGE.

We publish herewith, on page 22, Dr. Woodman's summer cottage, at Great Diamond Island, near Portland, Me. Dimensions: Front, 40 ft. 6 in.; side, 30 ft. 6 in., exclusive of piazza. Height of ceilings: First story, 9 ft.; second, 8 ft. Foundation, brick piers. The exterior throughout is covered with shingleboards and then shingled and painted light olive green, with bottle green trimmings. Roof shingled and painted red. In the arrangement of the rooms all the space is utilized to the best advantage and the principal feature is the spacious hall, with double doors, shaded and covered by the main roof. The interior throughout is trimmed with whitewood. The living room, spacious, contains a paneled divan and a large open fireplace, built of brick, with hearth laid with marble and provided with a hand stove and bath room. The staircase, of ornamental design, starts from dining room. This dining room has a china closet and fireplace. The floors are of hard wood, laid in narrow widths. Kitchen and its apartments are replete. Second floor contains six bed rooms, with closets and bath room. The latter wainscoted and furnished with the usual fixtures. Cost \$3,300 complete. Messrs. J. R. and W. P. Richards architects, 44 Court Street, Boston, Mass. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

#### A RESIDENCE AT RUTHERFORD, NEW JERSEY.

Our engraving, on page 22, presents a residence recently erected for Theodore G. Hosier, Esq., at Rutherford, N. J., and from plans prepared by the proprietor. It is located on the hill overlooking the Hackensack Valley, the Orange Mountains and Staten Island. Dimensions: Front, 31 ft.; side, 45 ft. 6 in., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. Foundation, stone. Underpinning, brick. Exterior framework is shingled, clapboarded and painted French gray, with trimmings of a darker shade. Roof, shingled. Spacious piazza, with yellow pine flooring and ceiling. The interior throughout is trimmed with white pine. Hall is stained and finished in black walnut, parlor and library in mahogany, and dining room in oak. Hall contains an ornamental staircase, turned out of black walnut. The window in hall is decorated by colored glass (colored glass pictures held between two glass plates, imported from Germany). Parlor is provided with a hard wood mantel. Kitchen is trimmed and wainscoted with yellow pine, finished natural, and is fitted up with pantry, range, sink, &c. The second floor is finished natural with hard oak and it contains four bed rooms and bath room. Bath room is wainscoted with yellow pine, trimmed with black walnut, and furnished replete. There is one bed room on third floor, besides a single storeroom. Ceemented cellar under whole of building. Heated by the Spence hot water heater. Supplied with water. Cost, \$4,500, including plumbing.



#### ARCH OF SCARLET RUNNER BEANS.

heater, etc., complete. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

#### A STATEN ISLAND COTTAGE.

We illustrate on page 23 a dwelling of low cost, erected for Frederick E. Strom, Esq., at Oakwood, Staten Island. Dimensions: Front, 25 ft. 6 in.; side, 41 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Ceemented cellar under whole of house, contains furnace. The underpinning is built of brick, while the rest is of wood. The first story is clapboarded and painted colonial yellow, and the second story shingled and stained moss green. The roof is shingled and stained similar. The interior throughout is trimmed with white pine and is treated in delicate colors. The doors and windows have beaded casings and turnings black. Hall contains an ornamental staircase turned out of ash. The parlor and dining room have large, open fireplaces, built of buff brick, with hearth laid of same, and furnished with mantels. Kitchen is wainscoted and fitted up with sink, wash trays, china, tin plate and pantry. There are four bed rooms, large closets and bath room on second floor. Bath room is wainscoted and fitted up complete. The third floor is not partitioned, but three good rooms could be finished off if desired. The estimated cost for this house complete is \$5,000. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

METALS are found to conduct much faster than in galvanic connection than otherwise.

#### A ROW OF NEW YORK CITY HOUSES.

Our engraving on page 30 presents a row of model dwelling houses, recently erected for James T. Hall, Esq., on West Seventy-fifth Street, New York. These houses are built of rock-faced limestone, finished in mosaic. The present plans of one house, which we describe. The main building is 30 ft. wide and 40 ft. deep, with an extension of 28 ft. Height of ceilings: Cellar, 7 ft.; basement, 8 ft.; first story, 10 ft.; second, 10 ft.; third, 9 ft.; fourth, 8 ft. 6 in. Vestibule has a tiled floor laid in mosaic. This vestibule and hall are trimmed with antique oak, the latter having a paneled wainscoting and an ornamental staircase with carved newel posts, balusters, etc. Parlor and music room, trimmed with ash, are separated by columns supporting a simple transom. The fireplace in parlor is furnished with carvings of Mexican origin, a tiled hearth and a colonial mantel. Library is trimmed with cherry and has a fireplace of red granite. Dining room is trimmed with oak. It is provided with a parquetry floor, a paneled wainscot and a fireplace with tiles and mantel. Butler's pantry, trimmed with oak, is fitted up with china closet, butler's bowl, dumb waiter, and stairs leading to basement and second floor. On floor, trimmed with cherry, contains three bed rooms, dressing rooms, large closets and bath room. The dressing rooms are fitted up with bowls, drawers, and wardrobes, complete. The doors to wardrobes are glazed with carved glass pictures. The bath room is paneled and wainscoted with white English tile and is fitted up the best possible manner with exposed plumbing. The third floor contains two bed rooms and bath room, and the fourth floor contains three bed rooms and trunk room. The basement is provided with breakfast room, kitchen, laundry, pantries, larder, etc. These apartments are furnished with the necessary conveniences. Ceemented cellar, contains furnace and other necessary apartments. Mr. James T. Hall architect, No. 100 Fifth Avenue, New York.

#### A DWELLING AT RUTHERFORD, NEW JERSEY.

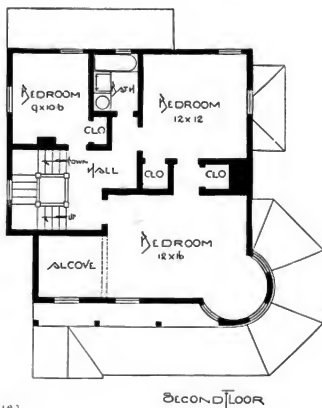
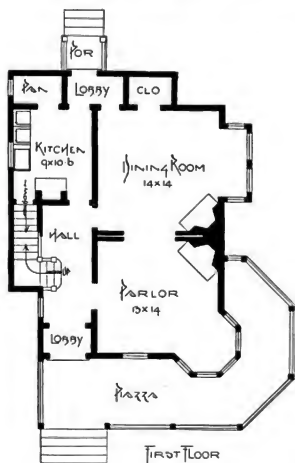
On page 31 will be found an engraving and floor plans of a dwelling house, recently erected for Edmond F. Crochereau, Esq., at Rutherford, New Jersey. Dimensions: Width, 40 ft. 6 in.; depth, 41 ft. 9 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The underpinning is built of brick, while the stone work above is built of red sandstone, rock faced, and laid up in red mortar. The exterior framework is shingled, covered with building paper, clapboarded, and painted olive yellow, with buff trimmings. Roofs shingled. The plan is excellent and the several apartments, communicating as they do, make a very attractive interior arrangement. The interior throughout is trimmed with whitewood, finished natural. Parlor and library are well lighted and are separated by an arch, provided with a transom, filled in with spindle work. Hall and dining room have a paneled wainscoting and fitted up with the best furniture, with tiled hearths and hard wood mantels. The hall has also a hard wood floor and an ornamental staircase, turned out of ash, which is lighted by a stained glass window with pleasing effect. Kitchen and pantries are wainscoted and fitted up with the best fixtures in the best possible manner. The second floor contains a large hall, four bed rooms and bath room, the latter wainscoted and fitted up replete with exposed plumbing. The third floor is not partitioned off, but three bed rooms could be built, or a study and bath room. The house is provided with gas, electric bells, speaking tubes, etc. Cost, \$5,000 complete. Mr. W. D. Peck architect, Rutherford, New Jersey.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

#### Plans and Specifications.

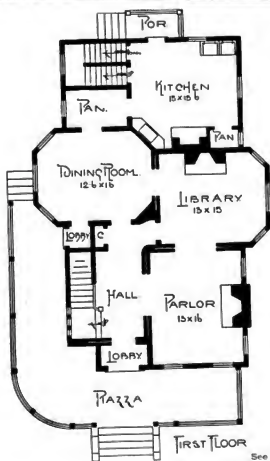
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[See page 16.]

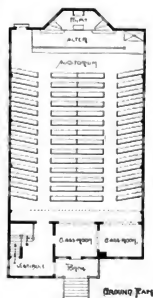
A COTTAGE OF MODERATE COST.



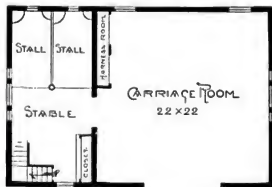
See page 16.]

A RESIDENCE NEAR NEWARK, N. J.





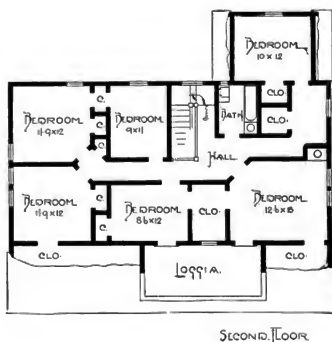
A CHURCH AT CHESTER HILL. [See page 16.]



GROUND PLAN

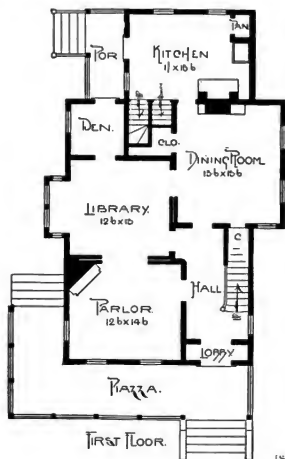
[See page 16.]

A CARRIAGE HOUSE OF LOW COST.



[See page 17.]

A SUMMER COTTAGE.



[See page 17.]

A RESIDENCE AT RUTHERFORD, N. J.

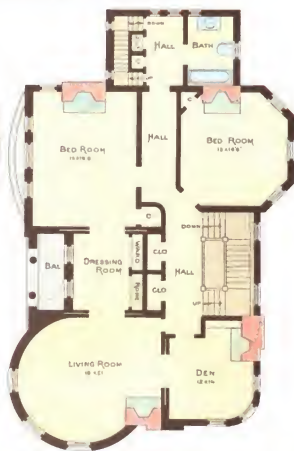


A COTTAGE AT RUTHERFORD, N.J.

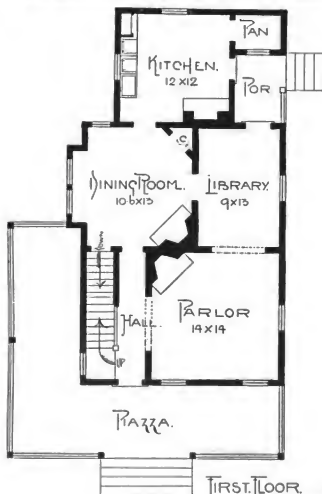




A RESIDENCE IN BROOKLYN, N.Y.

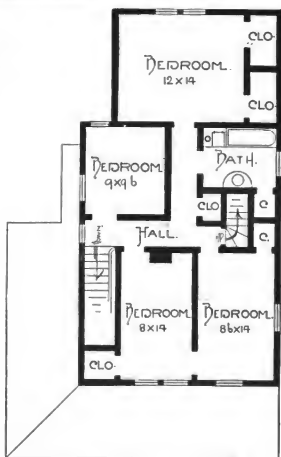






FIRST FLOOR. See page 17.]

A STATEN ISLAND COTTAGE.



SECOND FLOOR.

### THE THREE TEMPLES AT SHEITLA, NORTH AFRICA. BY ALEXANDER GRAHAM, F.R.S.

A glance at a map of North Africa is necessary to give the reader an idea of the geographical position of Sheitla. Three days' journey from Tunis, either along the coast by way of Sousse or across country by Zanzibar, belongs the traveler to Kairouan, and a ride of about seventy miles from that holy city in a south-westerly direction enables him to reach the banks of the pretty stream that once skirted the walls of the ancient city of Sufetula. The modern name of Sheitla is an Arab corruption, as that of Shilba, some thirty miles farther north, represents the original name of Sufes. Whether this word Sufes was associated in old times with *Suffes*—the two supreme magistrates who ruled over Carthage, and whose title bears a resemblance to the Hebrew *Shafetim*, mistranslated in the Bible, Judges—is open to doubt. The history, however, of Sufetula is so intimately interwoven with the progress of Christianity in North Africa, and with the first disastrous encounter of a Christian population with the followers of Mahomet, that European as well as Arab historians have given it a special place in their records. Eminent Arab geographers of the twelfth century, tells us that "Sobeitula was, before the Arab

invasion, bear ample testimony to the wealth and importance of Sufetula prior to the Arab invasion. The principal monument that has withstood the ravages of time and the neglect of more than twelve centuries consists of a range of three temples, placed side by side, and partly attached. They may be assigned to the reign of Antoninus Pius, A. D. 138-161. The porticoes formed nearly the whole of one side of a large walled inclosure, measuring about 340 ft. square, to which access was obtained through a monumental gateway facing the temples. This gateway, in very fair preservation, is still standing. The back walls of the three temples formed the back of the inclosure, and behind them ran one of the main streets of the city. The central edifice is of larger proportions than the two that flanked it, and is of a more ornate character. Its order is Composite, the others being Corinthian. They are all tetrastyle and pseudo-peripteral. The cells of the middle temple has engaged columns at the sides and back, but the others have pilasters only. The back walls of the three temples, the entire cells of the central one and a greater part of the back walls of the side ones are still standing. The porticoes are overthrown, but the bases of many of the columns are in position, as well as the lines of steps. The broken monoliths

The illustration is a restoration of the three temples and of a portion of the inclosure, being the result of actual measurement on the spot and of sketches of the details of the architecture. It is satisfactory to know that the *Société des Monuments Historiques* is keeping a watchful eye over these interesting remains as well as over the other ruined edifices and inscribed stones, and that in course of time our knowledge of this ancient city and of the important part it played in the spread of Christianity during the rule of the Byzantine emperors may be largely extended.

The appearance of Sufetula, as it was in the fourth and fifth centuries, is easy to imagine. Situated on rising ground, at a point where the great highway from Carthage in the interior intersected the main road from Thysdrate seaward, its position was a commanding one. A fertile soil, forests of pine trees, and a never-failing river of pure water that ran by the city walls, contributed to make Sufetula a place of delight for the wealthy residents of North Africa. To-day it is dreary, unpeopled spot, lying "remote, unfrequented," in the midst of a trackless country. The waters are still there, a perennial stream, pure as crystal, but the trees are gone, the plains are arid or clothed with rough herbage, and all signs of habitation have long since passed



ROMAN TEMPLES IN AFRICA—RESTORED BY ALEX. GRAHAM, F.R.S.

invasion, the town of Gerges (Gergis), King (prefect) of the Romans of Africa; it was remarkable for its extent as well as for the beauty of its situation, for its abundant water, for the mildness of its climate, and for its wealth; it was surrounded by orchards and gardens. The Mussulmans conquered it during the first year of the Hegira, and put the great King Gerges to death." Other writers tell us that this Gerges, sometimes written Gergoris, had revolted from the Byzantine Empire, and had made himself ruler of the whole country from Tripoli to Tangiers, making Sufetula his capital. With the appearance of the Arabs in this remote corner of North Africa commenced the struggle for supremacy between the representatives of Christianity and the followers of Mahomet. The city, having no walls of defense, soon succumbed to the invader. Gergoris was slain, and the treasure of a numerous and wealthy population passed into the hands of the victorious army. With this calamity the records of Sufetula cease, and Christianity in Africa received a blow from which it never recovered.

The monumental remains are extensive, though it would be difficult to define the exact boundaries, owing to the absence of external walls. The lines of streets and the foundations of numerous buildings, both public and private, can be traced for nearly a mile in one direction, and somewhat less than half a mile in another. The ruined edifices, many of them of noble propor-

tion, which were more than 30 ft. high, with their enriched capitals and huge fragments of sculptured ornament, he piled up one on another in a unjostle and imposing mass. The inclosure appears to have been paved with immense slabs of stone, which are still visible some 4 ft. below the present surface. Around it was a colonnade and, from the general appearance of the remains and the number of *frons* of shafts of varying dimensions, it is reasonable to suppose that there were other shrines or votive monuments within the inclosure. The entrance, as already stated, was through a gateway of three arches, and within the gateway was a portico connecting the colonnades on either side. It was evidently intended that the entrance should face the central temple, but, for some unaccountable reason, it is fully 30 ft. in the west of the central line of axis of the inclosure. The custom of inclosing sacred edifices with walls of defense originated at some remote period when temples were used as depositories for the treasure of a city, as well as for affording shelter to women and children in times of invasion. At Carthage, for instance, the chief temple in the city, dedicated to Æsculapius, stood within the citadel. The Parthenon at Athens was within the walls of the Acropolis, and the temple of Jupiter in Rome was the Capitol. At Balbec also there is an inclosure commonly called the *Huron*, bearing some resemblance, though on a larger scale, to this one at Sufetula.

away. Yet, in spite of prevailing desolation, this spot so far removed from human dwellings, its ruined fountains outlined sharp against the sky, its weed-stones standing ghost-like on the outstretched plain, the stillness of the air broken only by the babbling of the waters, has much to charm the eye and quicken the imagination.—*The Builder*.

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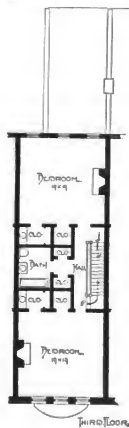
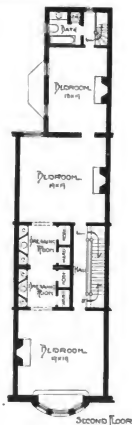
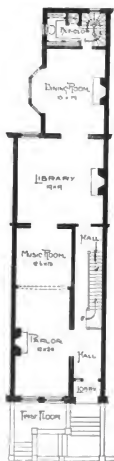
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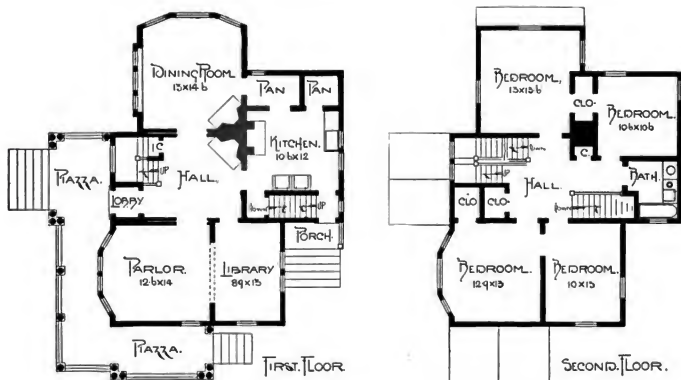
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[See page 17.]

A ROW OF NEW YORK CITY HOUSES.



[See page 17.]

A DWELLING AT RUTHERFORD, N. J.

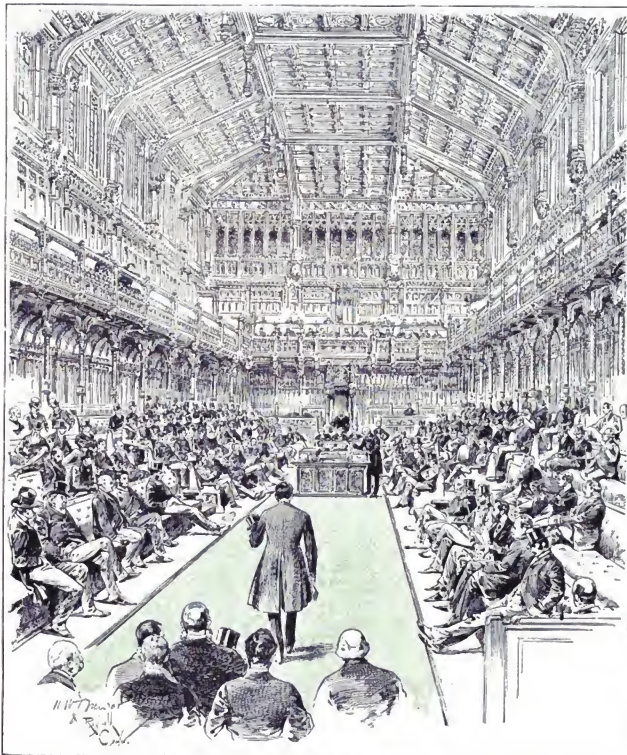
THE HOUSE OF COMMONS.

The new palace of Westminster (1848-67), built at a cost of about \$15,000,000, from the designs of Barry, for the Houses of Parliament, on the site of the old palace destroyed by fire in 1835, is a vast and ornate building, in the Tudor-Gothic style, covering altogether an area of about 5 acres. Toward the Thames River it presents a very richly adorned and effective facade. At the northeast corner is the clock tower, 320 feet in height, resembling the clock tower at Bruges; above the dome,

Prof. St. George Mivart says, in the *Cornacopolian*: "The most obvious and familiar instance of the evolution of a new individual animal is the hatching of a hen's egg. A new laid egg contains nothing but an apparently lifeless mass of two semi-fluid substances—the white and the yolk; nor will the highest powers of the microscope reveal more therein than certain minute, rounded bodies, technically called 'cells.' Yet it needs nothing but a persistent supply of moderate

downy feathers, chips the shell, comes forth and walks about this new world with widely open eyes and quickly shows the sharpness of its senses by pecking at grains and even catching an insect on the wing! The really wonderful nature of this growth is generally unthought of by us on account of our very familiarity with it. But the more we ponder over it, the more really marvelous it will appear.

TEXT'S A HORSE FOR LAMENESS.—When examin-



INTERIOR OF THE HOUSE OF COMMONS, LONDON.

over the central hall, a spire rises to the height of 300 feet; and the Victoria tower, 340 feet, surmounts the royal entrance at the southwest corner. The central hall, which is entered by St. Stephen's Porch and St. Stephen's Hall, built above St. Stephen's Crypt, a portion of the old building, separates the House of Peers, which, along with the royal women, occupies the west portion of the building, from the House of Commons, to which the eastern portion is assigned. We give here, from the *London Daily Graphic*, a view of the chamber of the House of Commons, Mr. Gladstone addressing the House.

warmth to make that seemingly inert, semi-fluid matter become a definite organism being possessing the most surprising powers. These little cells will arrange themselves in three superficial layers; the layers will fold themselves in complex ways, thickening here and there and growing in various directions. Soon the brain that is to be is sketched out: a tube arises beneath, folds itself, and becomes a pulsating heart, and blood is formed and begins to circulate. Gradually the body distinctly shows itself and incipient limbs bud forth, till the different parts, with all their organs, become defined, and ultimately a living bird, clothed with

ing a horse with a view to purchasing, says a contemporary, always have him led down a steep or stony descent at the end of a halter, and with no whip near him. Many horses when brought out of the stable are excited by the presence of strangers, and become still more so at the sight of a whip. A slight lameness may, therefore, be momentarily overlooked by the horse himself, just as a man, under strong excitement, will sometimes forget a sore foot. Leading the horse down a slope will show any defect in his forequarters, and running him back will develop any weakness that may exist in his hind legs.



## FRUIT CULTURE AT BARHAM COURT.

Nutting and apple, pear, cedar, chestnut, elm, and other trees of noble proportions. In one of the most charming parts of Kent, Barham Court, the seat of Roger Leigh, Esq., is surrounded by such that it is of interest to horticulturists and others able to fully appreciate the skill that finds expression both on the farms and in the gardens, and also the beauty of scenery, which

craps, grown as upright cordons in the quarters, and those who had the opportunity last autumn of seeing the long row of this variety trained to a double trellis are not likely to soon forget the effect produced by the heavy crop of huge fruits.

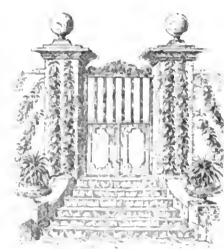
The apple trees trained as upright cordons have much the same attention as the pears, but they are occasionally lifted to check any undue vigor of which

The gardens of Barham Court are undoubtedly best known from the success Mr. Woodward has achieved in the cultivation of apples and pears; but they are and the less remarkable for their pomegranates and nectarines, which are grown very extensively, and with a high degree of success. Several spacious houses are occupied by these fruits, and a large area of wall space is devoted to them, with the result that about 14,000 fruits are gathered annually. One of the great features of these gardens is formed by the standard peach and nectarine trees, which in their way are quite unique. They have two houses devoted to them, both about 80 ft. in length, and one 20 ft. and the other 40 ft. in width, the larger structure having a domed span roof. The trees range from 15 to 18 ft. in height, and the largest have heads fully 17 ft. through.

The fruit room, of which an illustration is given herewith, is in every way worthy of a garden in which fruit is grown so largely and with such remarkable success. As shown by the ground plan at the top of the figure, the building is square, and provided with double walls, these being far enough apart to allow a pass to pass between them. The roof has a thick covering of thatch, and the interior is fitted with open shelves arranged about twelve inches above each other. The shelves have a slight slope from the back to the front, and are formed with beveled deal bars, which prevent the fruits rotting or pressing against each other. No better structure for the keeping of fruit could well be desired, and we would suggest that it might with advantage serve as a model for fruit rooms in gardens where fruit culture receives the attention its importance would justify, but certainly no suitable place for the storage of the produce.—*The Gardener's Magazine.*



FRUIT ROOM AT BARHAM COURT.



ENTRANCE TO FRUIT GARDEN AT BARHAM COURT.

is, in a large measure, due to the efforts of the cultivator.

Barham Court is situated about four miles to the west of Maidstone, and the estate is intersected by the Medway, both the house and gardens being on the north side of the river, and some distance from its bank. The fruit garden is of great extent. The area is enclosed and intersected by walls varying from ten to fourteen feet in height, and with the exception of a few quarters reserved for early crops of vegetables, and such choice kinds as asparagus and sea-kale, the whole of the space is devoted to fruit trees. The walls are clothed with pears, peaches, nectarines, plums and cherries, and the quarters are filled to their utmost capacity with pears and apples. These two fruits form a strong feature, which is of special interest, as affording the most complete representation of the cordon system of cultivation to be found in the United Kingdom. Against the walls pears are grown almost exclusively as single cordons, but in the open quarters these fruits, with the apples, are grown as verbenas with from one to five stems each, and as pyramids. In each case heavy crops of fruit of the highest quality are obtained in seasons favorable to fruit production. What strikes the visitor the most forcibly in walking through the garden for the first time is the comparatively crowded state of the quarters, more particularly in the case of those devoted to upright cordons. These trees have for the most part live branches, and are trained to double trellises about ten feet in height and six feet apart, and the crops produced in favorable seasons are very heavy and the fruit of high quality. Last year the crops were prodigious, and the fruit of exceptional size. The pyramidal trees also were originally planted very close together, with a view to occupy the space as quickly as possible, and although they are now being gradually thinned to allow the selected trees more space for their development, it is of interest to note that with skillful management both apple and pear trees are exceedingly fruitful when they have much less space than is usually assigned them.

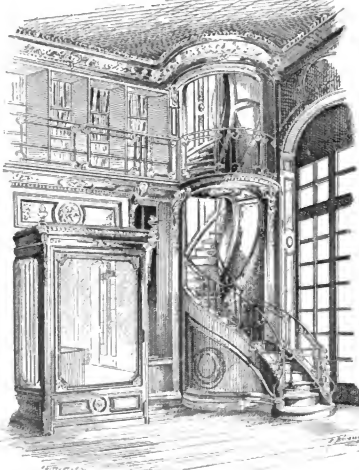
Care is taken to maintain the vigor of the trees by means of rich top dressings. Late in the autumn the top soil is removed from the border as far as the roots extend, and this is replaced with the manure and soil from an old cucumber bed and leaf mould, of which the trees in the spacious park afford, no doubt, liberal supplies. As regards the management of the trees, the shoots are stopped at the fifth or sixth leaf, as near the middle of June as possible. Great care is shown in the selection of the shoots that are to remain, and as far as practicable, those near the main stem are left with a view to avoid the long spurs which so greatly disfigure the cordon trees in many gardens. The varieties that are found to succeed best at Barham Court are Pitmaston Duchess (which bears enormous crops of magnificent fruit, and is of high quality); Doyenne du Comice (considered by Mr. Woodward to be one of the very finest of the autumn varieties); Louise Bonne, of Jersey, Marie Louise (which bears, contrary to general experience, can only be successfully grown on the quince); Bourne Hardy, Bourne Najette, Emile d'Heyst, and Magenta. The most promising of the pears of recent introduction that are on trial are Madame A. Leroy, President d'Ormanville, and Madame de Thérault. Pitmaston Duchess also bears excellent

there may be unmistakable signs. Stopping and thinning of the shoots receive careful attention during the summer, as in the case of the pears, and late in the autumn or early in the winter the trees receive an application of manure. In doing this the soil is removed from the surface, the depth being determined by the distance of the roots from the surface; the manure is then applied, and covered with soil. The two varieties

## WOOD AND IRON STAIRWAY AT THE NATIONAL LIBRARY.

Our engraving gives a perspective view of a small stairway recently established in the manuscript hall of the National Library.

The stairway itself is of carved oak, and the stairs are of forged iron. The small volutes that form brack-



STAIRWAY, NATIONAL LIBRARY, PARIS

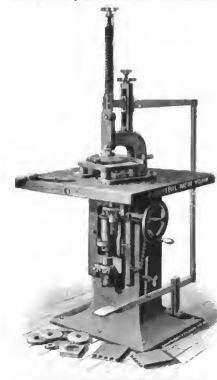
which require the most liberal dressings of manure are Ribston Pippin and Cox's Orange Pippin, it being, Mr. Woodward believes, almost impossible to manure the last named too heavily when the trees are in bearing. Between sixty and seventy varieties of apples are represented in the collection.

sets under the intermediate landing projecting on the side of the hall are of gilded copper.

The whole is set off with paint. This entire piece of work, executed under the direction of and from drawings by our confrere Mr. Pascal, produces a charming effect.—*La Semaine des Constructeurs.*

AN ORNAMENTAL WOOD-WORKING MACHINE.

The illustration represents a new patent combined corner block, rosette, dovetailing, and edge-moulding machine designed to turn out from twenty-five to thirty perfect corner blocks per minute and using cutters up to 4 1/4 in. in diameter. The blocks may be 6 inches square or over. Adjustable gauges are provided for holding the blocks in the center, or for guiding long strips that are to have rosettes cut at intervals as shown by the cuts of work done on this machine.



FRYBURN'S FANCY WOOD-WORKING MACHINE.

chine. The best way to make detached rosettes is to cut them almost through long strips and then pass the strips through a planer, in order to remove the part left standing by the rosette cutter. The machine is, however, provided with an attachment for making the rosette complete in one operation.

To obtain the best results, kiln-dried stock should be used. Waste pieces of all kinds can be collected and put in the steam box or near the boiler, thoroughly dried, passed through the planer, and turned into sets of corner blocks, thus utilizing what would otherwise be of no value. Interior house trimmings are thus reduced to a minimum. It will also cut pine, yellow pine, birch, black walnut, oak, ash, maple, spruce, soft California redwood, and in fact all kinds of woods used in house trimmings. The variety of work this machine will turn out is unlimited, and one set of cutters will turn out quite a number of different designs.

When the machine is to be used for moulding, it is furnished with an extension for the spindle, collar for the extension and reducing rings for the hole in the table. It is not necessary to remove the upper works, but simply slide them back out of the way.

For dovetailing the machine is furnished with an "improved dovetailing attachment." To use the same it is only necessary to lay it loose on the table of the machine. After placing the stock on it, bring the former in contact with the collar on the cutter head, and by guiding it around it will produce a perfect dovetail, and in the hands of an ordinary mechanic, will rapidly execute some of the finest work, making a complete dovetail and finishing both

parts of the one joint in one operation. For further particulars, write to the manufacturer P. Fryburn, 307-319 W. Forty-first Street, New York City.

A New Heater Manufacturing Plant.

The Pierce, Butler & Pierce Mfg. Co. have concluded negotiations for the purchase of 15 acres of land in the city of Syracuse, where they intend erecting works for the manufacture of their "Florida" steam and hot water heaters. The buildings will all be of brick; two machine shops, each 100 x 200 ft. and two stories high; a foundry, 100 x 300 ft.; a core room, 60 x 100 ft.; and a cleaning room of the same size; a building for a boiler room and a blacksmith shop, 40 x 80 ft.; a store house, 100 x 300 ft.; a sand, red and coke house, 30 x 100 ft.; and an office building, 30 x 80 ft. The Pierce, Butler & Pierce Mfg. Co. will, shortly before January 1 next year, move their entire plant from Geneva, N. Y., to Syracuse. The new works at the latter place will be equipped with all the most modern improvements that can be obtained. The plant will require in the neighborhood of 400 men to operate it.

THE GOULD'S POWER PRESS affords the subject matter of a beautifully illustrated catalogue just issued. Among the special subjects of fine half-tone engravings are: their triplex boiler feed pump, pumping through heater to boiler; a triplex power pump, maintaining hydraulic pressure on wood pulp grinders; a triplex suction pump, connected to suction boxes on paper machine; a triplex exhaust pump, draining driers of paper machine, heating coils, etc.; a triplex power pump on tank service; a triplex electric power pump in apartment building, with numerous operating various styles of hydraulic elevators, and as employed for a variety of other work. The catalogue also gives a great deal of useful information as to the general service and efficiency of these pumps, which are made by the Goulds Manufacturing Co., of Seven Falls, N. Y.

Various Doctrines of Water Rights.

If the ancient and haphazard method of formulating the various doctrines of water rights that are slowly developing through the complex web of the decisions of the courts are not closely watched by somebody competent to discuss the subject in all its phases, we are apt to unexpectedly reach a condition in which it will be doubtful whether a man owns the water in his own well. The doctrine of priority of appropriation has always been supposed to apply to the water running in the open beds of streams. Whoever appropriates it first and follows up his appropriation by the construction of a ditch and the actual distribution of water over agricultural lands has the prior right to use the water of the stream. That much is fairly well settled; but whether he has the right to the entire year around flow of such a stream, or only so much of it as he actually needs during the irrigating season, is as yet an open question. But more difficult than this is the question whether this owner of a priority in an open stream has a right to the underground flow of the dry creek bed, which underground flow may be tapped by galleries and thus diverted from springs which formerly flowed into his stream above his ditch. Where do these vaguely marked water priorities begin and end? Out of the dry bed of the creek a few miles above Denver there once burst a splendid spring. A water company digging in the ground more than a mile above obtained a splendid flow of water in the gravel, which it conducted into its reservoir. The volume of water in the spring declined. The courts have decided that the owner of this spring is entitled to damages. This is a most important decision, bearing upon the rights of every land owner in the State, and its consequences are likely to be so far-reaching that it deserves the most extensive discussion.—*Fire and Water.*

IMPROVED BATH HEATER.

The Folding Bath Tub Company, of Marshall, Mich., have recently made an improvement in their bath heaters, consisting of an elliptic coil, constructed of 3/4 copper tubing, attached to the bottom of the heater in

such a way as to cause the water to circulate as soon as the burners underneath are lighted. In connection with the coil a three-way bib is so arranged that, by raising a lever, the circulation through the heater can be shut off and the water drawn through the coil into the bath. By so doing the temperature can be raised 20 while the water is running into the tub. The company are now using this heater on all their folding baths.



When a kite reaches a height of 1,000 ft., it has attained about its maximum elevation. Letting out more line does not allow the kite to rise higher, owing to the resistance of the line to the wind. By attaching other kites to the line, so that they assist in lifting it, remarkable heights are attainable. To find a series of kites in this manner requires keen judgment and considerable practice.

WILL-MADE CHAIRS AND ROCKERS.

For many years Mr. F. A. Sinclair, of Motville, N. Y., has enjoyed the well-earned reputation of making a variety of comfortable and exceedingly serviceable chairs for home use, which have no superior, illustrations of two of which are given herewith. The frames are hard wood, principally maple, oak, hickory, and

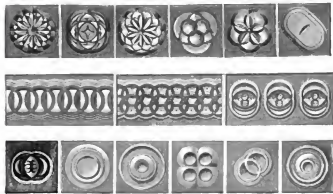


SINCLAIR'S COMMON SENSE RECLINING CHAIR.

rock elm, carefully selected, free from knots and shakes, and thoroughly seasoned—*not kiln-dried*. Each round and flat is driven as tight as possible and not split the wood joint with 1 x 2 glue, and finished with special varnish. The seats are of double cane, splined. They are not coarse and cheaply made, like many of the cane bottom chairs in the market, but are made by experienced workmen. The stuff is hand-turned and smoothly finished, and the rockers and chairs may be found as the favorite seat in parlors, sitting rooms, and libraries of the best homes of our land. The name of the maker is stamped on each chair.



BRANDMAN'S CHAIR.



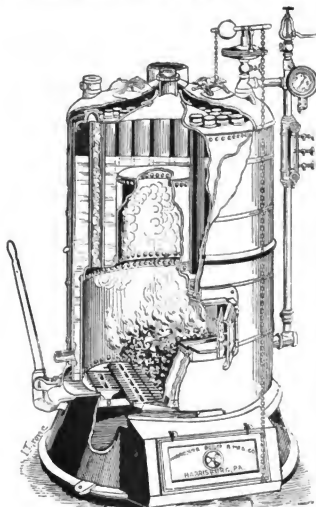
MACHINE-MADE ORNAMENTAL CORNER BLOCKS AND EDGE MOLDINGS.

A MAN up in Connecticut who wanted to put a water pipe through a drain several feet below the surface without digging up the drain, tied a string to a cat's leg, thrust her into one end of the drain, and giving a terrific "sawt" the feline quickly appeared at the other end. The pipe was drawn through the drain by means of the line, and an expense of ten dollars saved by the operation.

## AN IMPROVED HEATER.

The illustration represents a new style of "Star" gas burner heater, made by the Harrisburg Boiler and Manufacturing Company, of Harrisburg, Pa. It has great heating surface and is self-cleaning, all tubes being placed vertically. It has a most rapid and unimpeded circulation, making it especially valuable as a

combustion. It is provided with improved shaking grates for either anthracite or bituminous coal. For burner purposes it is provided with the best automatic appliances for self-regulation. The new features are the supplying of an automatic ash pit door, an opening just above the grates for clinker cleaning, a wrought iron adjustable shaker lever, etc. Its capacity for hot water is from 315 to 1,800 sq. ft. of direct radiation, and for steam, from 315 to 1,300 sq. ft.



THE HARRISBURG "STAR" GAS BURNER HEATER.

hot water heater. It consumes its own gas, i. e., the gas generated by the burning coal ascends into the gas chamber and is there held in suspension until consumed, thus securing more benefit from coal burned than is had from other constructions. Special attention is called to the proportions of this heater, for, while it contains a tremendous volume of water, its parts are so equally divided that there is no large body of water in it which is not directly affected by the fire surface of the fire box, flues, and the gas chamber. Its fire box is especially large, allowing deep fires, and hence slow

permits free breathing, and at the same time excludes the smoke from the lungs.

## AN IMPROVED VARIETY WOOD WORKER.

The machine shown in the illustration is specially suited for furniture and bracket factories, planing mills, carpenter, carriage, wagon, buggy and body makers, and general wood workers. The frame is of iron, and cast all in one piece. The table is of iron; is extra heavy and well braced, and can be moved full up and down like the bed of a planer. The sliding

## Kalsomining.

Kalsomining, or wall coloring in distemper, is best done about this time of the year, when the walls are not too cold or too hot. It may be done, says the *Paint and Varnish Journal*, any time during the winter, so that the walls do not freeze. There are a good many preparations put up for this purpose and called by various names. However, if you are where you cannot procure this, it may be prepared in the following manner: Whiten—To 10 pounds best whitening use 1/4 pounds white glue, 1/2 pound alum and a little ultramarine blue. Put the glue in cold water, set it on the fire, and stir until dissolved. Put about half a gallon of hot water over the whitening, and when dissolved add the glue, the blue, and the alum, which must also be dissolved in hot water. Stir this mixture well, and run through a sieve. For first coating, this may be used while hot, but the other coats must be cold. If your color works too stiff, a little soap will help. All colors and shades are made by adding the dry colors. Before kalsomining, the crack and nail holes should be filled with plaster of Paris. Mix this with paste, and it will not dry so quickly. If you have a good brush and work as quickly as possible, to avoid lumps, you will have a good job of kalsomining. A nice stenciled border run around the top of wall makes a nice finish.

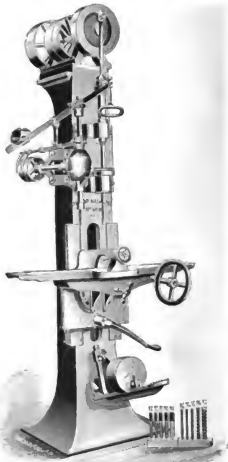
In case of fire, somebody asserts that a wet silk handkerchief, tied without folding over the face, is a complete security against suffocation by smoke; it

tables on each side of planing head are adjustable, and the ends can be reversed and a 30 in. saw put on mandrel. A hard wood board will take the place of the iron table most effectively, so as to accommodate saws, boards, or bits of odd sizes. The mandrel is of heavy steel, and the arbor boxes, which are self-oiling, are solid on frame and lined with the best babbit. On this machine the table rises and lowers, so that the operator on the one side does not interfere in any way with the adjustments of the operator at the other side, as is the case where the mandrel rises and lowers. The builders furnish this same frame and table for ripping and cross-cutting alone when wanted.

For further information in regard to this, address the builders and introducers, the Egan Company, 309 to 329 W. Front St., Cincinnati, O., U. S. A.

## AN IMPROVED MORTISE AND BORE.

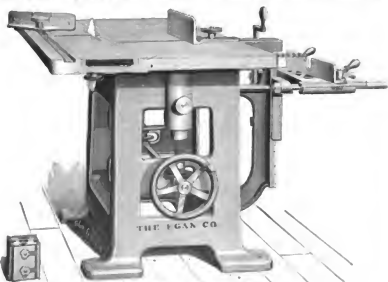
The accompanying engraving represents a newly designed mortise and borer built by the Indiana Machine Works, Ft. Wayne, Ind. It commends itself for its simplicity, compactness, strength and workmanship. The column is cored out and cast in one piece. The table is fitted to dovetail ways on column, and



AN IMPROVED MORTISE AND BORE.

has long bearings with adjustable gibs to compensate for wear. It is adjustable vertically for different thicknesses of stock, horizontally and laterally, convenient devices being provided to enable a speedy manipulation of said fixture; it may also be tilted to admit of radial boring. The spindle is of large diameter, running in long bearings, and is made of the best steel procurable. The chisel reverser and stop are of cast steel; by a very convenient device the chisel may be reversed the moment it leaves the work, something that cannot be said of all mortisers; the spindle, plunger and connecting rod are all perfectly fitted and connected, provisions being made for wear. For further particulars address the makers, Indiana Machine Works, Ft. Wayne, Ind.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., Scientific American office, New York.



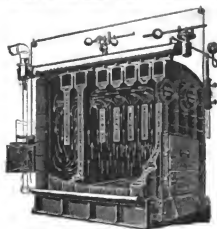
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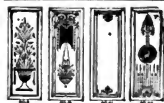
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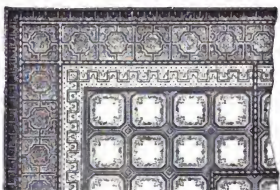


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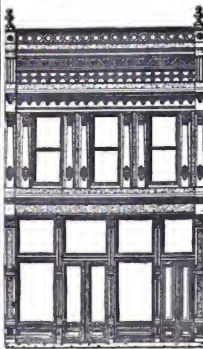
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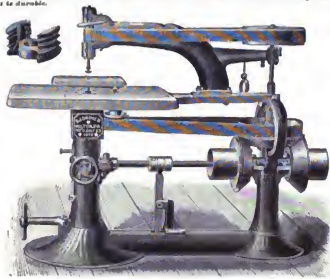


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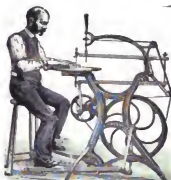
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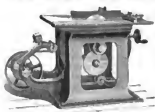
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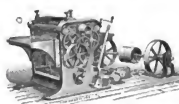
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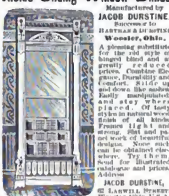
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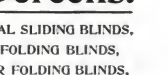
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6156, 6168, 6180, 6192, 6204, 6216, 6228, 6240, 6252, 6264, 6276, 6288, 6300, 6312, 6324, 6336, 6348, 6360, 6372, 6384, 6396, 6408, 6420, 6432, 6444, 6456, 6468, 6480, 6492, 6504, 6516, 6528, 6540, 6552, 6564, 6576, 6588, 6600, 6612, 6624, 6636, 6648, 6660, 6672, 6684, 6696, 6708, 6720, 6732, 6744, 6756, 6768, 6780, 6792, 6804, 6816, 6828, 6840, 6852, 6864, 6876, 6888, 6900, 6912, 6924, 6936, 6948, 6960, 6972, 6984, 6996, 7008, 7020, 7032, 7044, 7056, 7068, 7080, 7092, 7104, 7116, 7128, 7140, 7152, 7164, 7176, 7188, 7200, 7212, 7224, 7236, 7248, 7260, 7272, 7284, 7296, 7308, 7320, 7332, 7344, 7356, 7368, 7380, 7392, 7404, 7416, 7428, 7440, 7452, 7464, 7476, 7488, 7500, 7512, 7524, 7536, 7548, 7560, 7572, 7584, 7596, 7608, 7620, 7632, 7644, 7656, 7668, 7680, 7692, 7704, 7716, 7728, 7740, 7752, 7764, 7776, 7788, 7800, 7812, 7824, 7836, 7848, 7860, 7872, 7884, 7896, 7908, 7920, 7932, 7944, 7956, 7968, 7980, 7992, 8004, 8016, 8028, 8040, 8052, 8064, 8076, 8088, 8100, 8112, 8124, 8136, 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11844, 11856, 11868, 11880, 11892, 11904, 11916, 11928, 11940, 11952, 11964, 11976, 11988, 12000, 12012, 12024, 12036, 12048, 12060, 12072, 12084, 12096, 12108, 12120, 12132, 12144, 12156, 12168, 12180, 12192, 12204, 12216, 12228, 12240, 12252, 12264, 12276, 12288, 12300, 12312, 12324, 12336, 12348, 12360, 12372, 12384, 12396, 12408, 12420, 12432, 12444, 12456, 12468, 12480, 12492, 12504, 12516, 12528, 12540, 12552, 12564, 12576, 12588, 12600, 12612, 12624, 12636, 12648, 12660, 12672, 12684, 12696, 12708, 12720, 12732, 12744, 12756, 12768, 12780, 12792, 12804, 12816, 12828, 12840, 12852, 12864, 12876, 12888, 12900, 12912, 12924, 12936, 12948, 12960, 12972, 12984, 12996, 13008, 13020, 13032, 13044, 13056, 13068, 13080, 13092, 13104, 13116, 13128, 13140, 13152, 13164, 13176, 13188, 13200, 13212, 13224, 13236, 13248, 13260, 13272, 13284, 13296, 13308, 13320, 13332, 13344, 13356, 13368, 13380, 13392, 13404, 13416, 13428, 13440, 13452, 13464, 13476, 13488, 13500, 13512, 13524, 13536, 13548, 13560, 13572, 13584, 13596, 13608, 13620, 13632, 13644, 13656, 13668, 13680, 13692, 13704, 13716, 13728, 13740, 13752, 13764, 13776, 13788, 13800, 13812, 13824, 13836, 13848, 13860, 13872, 13884, 13896, 13908, 13920, 13932, 13944, 13956, 13968, 13980, 13992, 14004, 14016, 14028, 14040, 14052, 14064, 14076, 14088, 14100, 14112, 14124, 14136, 14148, 14160, 14172, 14184, 14196, 14208, 14220, 14232, 14244, 14256, 14268, 14280, 14292, 14304, 14316, 14328, 14340, 14352, 14364, 14376, 14388, 14400, 14412, 14424, 14436, 14448, 14460, 14472, 14484, 14496, 14508, 14520, 14532, 14544, 14556, 14568, 14580, 14592, 14604, 14616, 14628, 14640, 14652, 14664, 14676, 14688, 14700, 14712, 14724, 14736, 14748, 14760, 14772, 14784, 14796, 14808, 14820, 14832, 14844, 14856, 14868, 14880, 14892, 14904, 14916, 14928, 14940, 14952, 14964, 14976, 14988, 15000, 15012, 15024, 15036, 15048, 15060, 15072, 15084, 15096, 15108, 15120, 15132, 15144, 15156, 15168, 15180, 15192, 15204, 15216, 15228, 15240, 15252, 15264, 15276, 15288, 15300, 15312, 15324, 15336, 15348, 15360, 15372, 15384, 15396, 15408, 15420, 15432, 15444, 15456, 15468, 15480, 15492, 15504, 15516, 15528, 15540, 15552, 15564, 15576, 15588, 15600, 15612, 15624, 15636, 15648, 15660, 15672, 15684, 15696, 15708, 15720, 15732, 15744, 15756, 15768, 15780, 15792, 15804, 15816, 15828, 15840, 15852, 15864, 15876, 15888, 15900, 15912, 15924, 15936, 15948, 15960, 15972, 15984, 15996, 16008, 16020, 16032, 16044, 16056, 16068, 16080, 16092, 16104, 16116, 16128, 16140, 16152, 16164, 16176, 16188, 16200, 16212, 16224, 16236, 16248, 16260, 16272, 16284, 16296, 16308, 16320, 16332, 16344, 16356, 16368, 16380, 16392, 16404, 16416, 16428, 16440, 16452, 16464, 16476, 16488, 16500, 16512, 16524, 16536, 16548, 16560, 16572, 16584, 16596, 16608, 16620, 16632, 16644, 16656, 16668, 16680, 16692, 16704, 16716, 16728, 16740, 16752, 16764, 16776, 16788, 16800, 16812, 16824, 16836, 16848, 16860, 16872, 16884, 16896, 16908, 16920, 16932, 16944, 16956, 16968, 16980, 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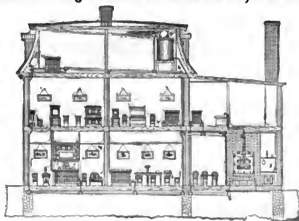


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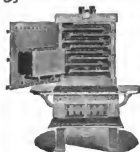
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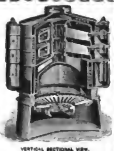
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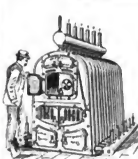
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1892

Gurney

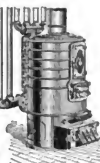
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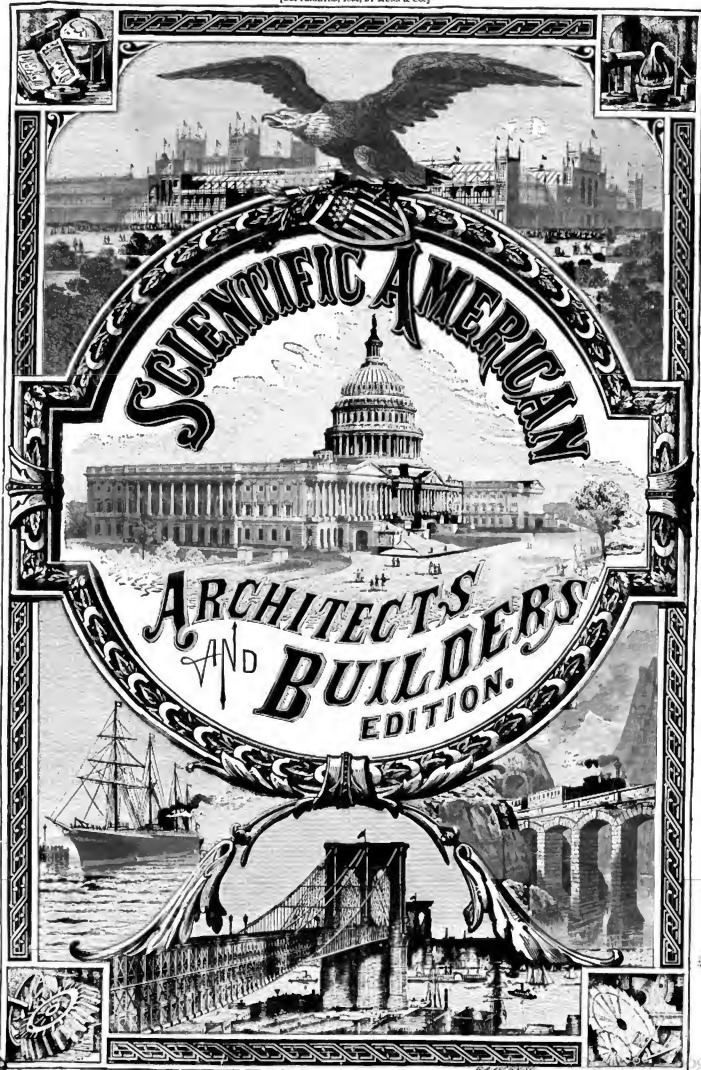
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Length.	Width.	Length.	Width.
3 in.	4 in.	3 in.	4 in.
3 in.	6 in.	3 in.	6 in.
3 in.	8 in.	3 in.	8 in.
3 in.	10 in.	3 in.	10 in.
3 in.	12 in.	3 in.	12 in.
3 in.	14 in.	3 in.	14 in.
3 in.	16 in.	3 in.	16 in.
3 in.	18 in.	3 in.	18 in.
3 in.	20 in.	3 in.	20 in.
3 in.	22 in.	3 in.	22 in.
3 in.	24 in.	3 in.	24 in.
3 in.	26 in.	3 in.	26 in.
3 in.	28 in.	3 in.	28 in.
3 in.	30 in.	3 in.	30 in.
3 in.	32 in.	3 in.	32 in.
3 in.	34 in.	3 in.	34 in.
3 in.	36 in.	3 in.	36 in.
3 in.	38 in.	3 in.	38 in.
3 in.	40 in.	3 in.	40 in.
3 in.	42 in.	3 in.	42 in.
3 in.	44 in.	3 in.	44 in.
3 in.	46 in.	3 in.	46 in.
3 in.	48 in.	3 in.	48 in.
3 in.	50 in.	3 in.	50 in.
3 in.	52 in.	3 in.	52 in.
3 in.	54 in.	3 in.	54 in.
3 in.	56 in.	3 in.	56 in.
3 in.	58 in.	3 in.	58 in.
3 in.	60 in.	3 in.	60 in.
3 in.	62 in.	3 in.	62 in.
3 in.	64 in.	3 in.	64 in.
3 in.	66 in.	3 in.	66 in.
3 in.	68 in.	3 in.	68 in.
3 in.	70 in.	3 in.	70 in.
3 in.	72 in.	3 in.	72 in.
3 in.	74 in.	3 in.	74 in.
3 in.	76 in.	3 in.	76 in.
3 in.	78 in.	3 in.	78 in.
3 in.	80 in.	3 in.	80 in.
3 in.	82 in.	3 in.	82 in.
3 in.	84 in.	3 in.	84 in.
3 in.	86 in.	3 in.	86 in.
3 in.	88 in.	3 in.	88 in.
3 in.	90 in.	3 in.	90 in.
3 in.	92 in.	3 in.	92 in.
3 in.	94 in.	3 in.	94 in.
3 in.	96 in.	3 in.	96 in.
3 in.	98 in.	3 in.	98 in.
3 in.	100 in.	3 in.	100 in.

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NAME "CATALOGUE A" IN YOUR  
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**Stanley's Butt and Rabbit Gauge.**  
FOR RABBING DOGS, BORTHING, RABBING, ETC.



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cannot buy more sen-  
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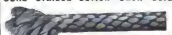


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**ARCHITECTS AND BUILDERS EDITION.**  
NEW YORK, SEPTEMBER, 1892.

Vol. XIV.

Subscription, \$2.50 a Year.

Single Copies, 25 Cents.

No. 3.



A RESIDENCE AT MONTCLAIR, N. J.—See Page 32.

## Scientific American.

ESTABLISHED 1848.

MUNN &amp; CO., Editors and Proprietors.

NO. 381 BROADWAY, NEW YORK.

E. D. MANN.

A. E. REAR.

NEW YORK, SEPTEMBER, 1892.

THE

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MUNN &amp; CO., Publishers, 381 Broadway, New York.

## CONTENTS.

Of the September number of the Architects and Builders Edition of THE SCIENTIFIC AMERICAN.

(Illustrated articles are marked with an asterisk.)

Articles	41	House Building Notes	41
Articles	42	Illustrated Paper Buildings	42
Articles	43	Illustrated Paper Buildings	43
Articles	44	Illustrated Paper Buildings	44
Articles	45	Illustrated Paper Buildings	45
Articles	46	Illustrated Paper Buildings	46
Articles	47	Illustrated Paper Buildings	47
Articles	48	Illustrated Paper Buildings	48
Articles	49	Illustrated Paper Buildings	49
Articles	50	Illustrated Paper Buildings	50
Articles	51	Illustrated Paper Buildings	51
Articles	52	Illustrated Paper Buildings	52
Articles	53	Illustrated Paper Buildings	53
Articles	54	Illustrated Paper Buildings	54
Articles	55	Illustrated Paper Buildings	55
Articles	56	Illustrated Paper Buildings	56
Articles	57	Illustrated Paper Buildings	57
Articles	58	Illustrated Paper Buildings	58
Articles	59	Illustrated Paper Buildings	59
Articles	60	Illustrated Paper Buildings	60
Articles	61	Illustrated Paper Buildings	61
Articles	62	Illustrated Paper Buildings	62
Articles	63	Illustrated Paper Buildings	63
Articles	64	Illustrated Paper Buildings	64
Articles	65	Illustrated Paper Buildings	65
Articles	66	Illustrated Paper Buildings	66
Articles	67	Illustrated Paper Buildings	67
Articles	68	Illustrated Paper Buildings	68
Articles	69	Illustrated Paper Buildings	69
Articles	70	Illustrated Paper Buildings	70
Articles	71	Illustrated Paper Buildings	71
Articles	72	Illustrated Paper Buildings	72
Articles	73	Illustrated Paper Buildings	73
Articles	74	Illustrated Paper Buildings	74
Articles	75	Illustrated Paper Buildings	75
Articles	76	Illustrated Paper Buildings	76
Articles	77	Illustrated Paper Buildings	77
Articles	78	Illustrated Paper Buildings	78
Articles	79	Illustrated Paper Buildings	79
Articles	80	Illustrated Paper Buildings	80
Articles	81	Illustrated Paper Buildings	81
Articles	82	Illustrated Paper Buildings	82
Articles	83	Illustrated Paper Buildings	83
Articles	84	Illustrated Paper Buildings	84
Articles	85	Illustrated Paper Buildings	85
Articles	86	Illustrated Paper Buildings	86
Articles	87	Illustrated Paper Buildings	87
Articles	88	Illustrated Paper Buildings	88
Articles	89	Illustrated Paper Buildings	89
Articles	90	Illustrated Paper Buildings	90
Articles	91	Illustrated Paper Buildings	91
Articles	92	Illustrated Paper Buildings	92
Articles	93	Illustrated Paper Buildings	93
Articles	94	Illustrated Paper Buildings	94
Articles	95	Illustrated Paper Buildings	95
Articles	96	Illustrated Paper Buildings	96
Articles	97	Illustrated Paper Buildings	97
Articles	98	Illustrated Paper Buildings	98
Articles	99	Illustrated Paper Buildings	99
Articles	100	Illustrated Paper Buildings	100

## A RESIDENCE AT PLAINFIELD, NEW JERSEY.

One of our plates in colors this month is a representation of "The Towers," recently erected at Plainfield, N. J., at Plainfield, N. J. The design is very picturesque, and the principal features are the towers, apocynus plaza and balconies. The first story is built of brick, and the second story of wood; the exterior shingled and stained stone, with trimmings painted white. Roof, shingled and painted red. Dimensions: Front, 44 ft. side, 53 ft.; not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The plan is excellent, and it shows a spacious hall and very large rooms, conveniently arranged and well lighted. Vestibule has a tiled floor. Wall is trimmed with quartered oak. It has a hardwood floor, a paneled wainscoting, and an open fireplace, built of brick, with hearth full of same. The top of the tower is an ornamental one with carved details, and it is lighted effectively by windows glazed with delicately tinted glass. The reception room is trimmed with sycamore, parlor and library with mahogany, and dining room with red chestnut. The fireplaces, where shown, are furnished in a very handsome manner with tiled hearths and facings and hardwood mantels. Dining room is provided with a hardwood floor and a paneled wainscoting. Kitchen and pantries are trimmed and wainscoted with yellow pine, finish of natural, and are fitted up in the best possible manner. The parlor is fitted up with white oak, and the dining room with mahogany. It contains five bedrooms, dressing rooms, closets and bathroom. The third floor contains room 17 x 17 ft. and servants' apartments. Cemented cellar contains laundry, furnace, etc. Cost \$9,000 complete. Mr. Oscar Trade, 217 Broadway, New York.

Our plate was made direct from a photograph of the building, taken specially for THE SCIENTIFIC AMERICAN.

## A RESIDENCE AT MONTCLAIR, NEW JERSEY.

One of our plates in colors this month illustrates the elegant residence of Edward Van Riper, Esq., at Montclair, New Jersey. Another view of the house is also shown on the title-page, 31. The design is excellent, and the building is constructed in the best possible manner, with good materials and first class workmanship. The underpinning and two sides of first story are built of red sandstone, rock faced and painted in red mortar. The two sides of the second story are similar and are fitted up with two sides of first story are clapboarded and painted gray, with red trimmings. Second and third stories are shingled and painted colonial yellow, with bottle green trimmings. Roof, shingled and painted red. Dimensions: Front, 48 ft. 6 in.; side, 37 ft.; not side, 37 ft. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft. 6 in.; third, 8 ft. 6 in. Hall is trimmed with cherry. It contains a very handsome staircase, with posts extending to ceiling. Between these posts the space is filled in with mahogany. This hall has a paneled ceiling, and it is well lighted by large stained glass windows on staircase landing. Drawing room and library are trimmed with cherry, and each are provided with open fireplaces, furnished with tiled hearths and hardwood mantels. Dining room is trimmed with oak, and is fitted up with wainscot and fireplace. Butler's pantry, rear hall and kitchen are wainscoted and trimmed with white wood, finished natural, and are furnished complete. Second floor contains four bedrooms, dressing room and bathroom. These apartments are trimmed with whiteoak, finished natural. Bathroom is wainscoted and fitted up complete. Four bedrooms on third floor. Cemented cellar contains furnace, laundry and other necessary apartments. Cost \$17,000 complete. Mr. Francis H. Kimball, 217 Broadway, New York.

Our plate and engraving were made direct from photographs of the building, taken especially for THE SCIENTIFIC AMERICAN.

## OUR COLORED PLATES FOR AUGUST.

By some error in the make up of our last number no proper description was given of the two houses there represented in colors. We now supply the omission. One of the plates illustrates a cottage erected for Mr. Kate Wyllie, at Rutherford, N. J. The design is excellent, and the building is constructed in the best possible manner, with good materials and first class workmanship. The foundation is built of stone and the underpinning of brick. The exterior framework is shingled and covered with paper; the first story being clapboarded and painted post gray with bottle green trimmings. The second story is shingled and painted colonial yellow with similar trimmings. Roof covered with slate. Dimensions: Front, 27 ft.; side, 34 ft. 6 in., exclusive of front piazza and rear lobby. Height of ceilings: Cellar, 7 ft.; first story, 8 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. Hall is trimmed with oak. It contains an ornamental staircase with turned newels, etc. This hall and staircase are lighted by a stained glass window. Parlor is trimmed with cherry, and dining room with oak, the former containing an open fireplace finished with a brickwork and a hardwood mantel. Kitchen and pantries are trimmed and wainscoted with yellow pine, finished natural, and are furnished complete. The second floor is trimmed with cherry, and it contains four bedrooms and bathroom, the latter wainscoted and provided with the usual fixtures complete. One bedroom and trunk

room on third floor. Cemented cellar under whole of building, contains furnace and other necessary apartments. Cost \$3,450 complete. Messrs. Schaeffer and Diemer, architects, Bennett Building, New York.

Our plate was made direct from a photograph of the building, taken specially for THE SCIENTIFIC AMERICAN.

The other colored plate in our August number illustrates a residence recently erected for J. G. Detmer, Esq., 27 North Avenue, near Prospect Heights, Brooklyn, N. Y. The design is of the Romanesque style of architecture, and it has many features of interest. It is built of Lake Superior stone, rock faced and tiled, and Sayre & Fisher, mottled, "Roman" shape, 1½ in. x 18 in. thick, of a light red color. The roof is covered with Dutch tile of a reddish brown color. The front entrance and balcony have colonial columns, while the bay window at library has cluster columns with carved capitals, flanked on either side of window openings. The depth of the main structure is 52 ft., with an extension of 10 ft. x 17 ft., while the width varies from 33 ft. to 38 ft. Height of ceilings: Basement, 8 ft. 6 in.; first story, 11 ft.; second, 9 ft. 6 in.; third, 9 ft. Vestibule and hall are trimmed with quartered oak; the former having a tiled floor laid in mosaic. Hall, finished in the English style, has a paneled wainscoting and ceiling beams, the space between the latter being filled in with cherry. The dining room, which contains a fireplace built of Tiffany brick, with hearth laid with same, and an ornamental staircase, with columns extending to ceiling, supporting a spindle transom. This hall and staircase are lighted by stained glass windows. Drawing room is lighted by Tiffany glass, with columns supporting a spindle transom. The fireplace is facing of Mexican onyx, tiled hearth, and a mantel designed in an exquisite manner. Library is trimmed with mahogany, and it has a paneled ceiling, carved mantel and a stained glass window over same. Dining room, with cherry trimmings, oak. It has a paneled wainscoting, ribbed ceiling, chandelier, buffet and fireplace. This dining room, hall, library and end on second floor have parquet floors. Butler's pantry is fitted up complete. Stairs leading to basement and third floor. Second floor, trimmed with cherry, contains living room, dressing room, two bedrooms, large closets and bath. Fireplaces finished complete. Bathroom, wainscoted with white English tiles, is fitted up in the best possible manner. Third floor contains sitting room, dressing room, three bedrooms, bathroom. The staircase is finished with red sandstone, rock faced and painted in red mortar. Kitchen, pantries, laundry, furnace, play room, etc. in basement. Mr. Montrose Morris, architect, No. 43 Exchange Place, New York.

Our plate was made direct from photographs of the building, taken specially for THE SCIENTIFIC AMERICAN.

## A HOUSE AT ARLINGTON, NEW JERSEY.

We present on page 37 the elevation and plans for a house for F. A. Nichols, Esq., at Arlington, N. J. It is from the designs of Mansel N. Phelps, of Marlboro, New York. It is a tasteful dwelling, in the colonial style, comfortable and convenient in plan, tasteful and attractive in appearance. Cost about \$5,000. On page 38 we give a sketch of the hall staircase. We are indebted to the Architectural Era for the illustrations.

## ASPHALT PAVING IN NEW YORK.

Commissioner Gilroy, of the Department of Public Works, New York, has submitted to Mayor Grant and the Board of Estimate and Apportionment, an interesting and comprehensive report on the extent, cost and condition of the asphalt pavements laid under the provisions of the act of 1869, authorizing experiments with this kind of material.

The reports state that since 1869 portions of sixty-four streets have been paved with asphalt. Of this number fifty-six have needed no repairs and are now in excellent condition. Four have been repaired, and four have not been accepted by the city on account of the inferior quality of the material used.

Three qualities of asphalt have been used in the work done to date. They are the pure asphalt from what is known as the Pitch Lake, in the island of Trinidad, the overflow deposits on the same island, and the European rock asphalt.

In his report the Commissioner says that while he would be glad to enlarge the list of competitors who bid for this work, experience has proved beyond question that the asphalt from Pitch Lake, in the island of Trinidad, is the best. It is the only one that will stand the climatic influences in this latitude. He thinks this quality should be used in all future work. This quality of pavement can be laid in New York cheaper than asphalt pavement is laid in European cities.

The streets in New York which are now of the residence part of the city, and the pavement has given general satisfaction. It is clean and comparatively noiseless, and experience has shown that it is the best pavement in existence from a sanitary point of view.

The Commissioner also states that the cost of laying asphalt pavement and keeping it in good repair for fifteen years is less than the original cost of granite block pavement. Taking the cost of the two and the expense of maintenance and repairs for fifteen years, there is a difference of forty per cent. in favor of asphalt.

## RESIDENCE OF CHARLES E. DICKENSON, DENVER, CO.

On page 34 we present a plate of this beautiful residence, which, from its tasteful design and elegant proportions, is worthy of special note. It is built of the hard gray sandstone of which there are extensive quarries at the north of Platte Canon, thirty miles from Denver. This dwelling is by Varian & Steiner, architects, Denver. It is replete with all the modern appliances, and cost about \$40,000.

Our engraving was made directly from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

## RESIDENCE OF W. S. RAYMOND, Esq., AT DENVER, CO.

On page 35 we illustrate the elegant residence of W. S. Raymond, Esq., Denver, Col., which was designed by Lang & Fugh, architects, of this city. It is built of lava stone, the main portion of body of the building being of a pink shade of lava, while the trimmings are of white lava. Porches of stone. The interior is of hardwood finish, mahogany, oak, etc. Walls frescoed throughout. It is a fine home. Cost about \$30,000.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

## A HOUSE FOR \$1,000.

On page 36 we illustrate a \$1,000 cottage, built at Lake Park, northern of Tacoma, Wash. Designed by Chas. R. Park, Portland, Oregon. The underpinning is built with 6 in. x 10 in. brick, laid in a running bond. Cellar, 12 ft. x 12 ft., under kitchen and part of hall, is lined with surfaced 2 in. plank, sills and floor, and is entered by door under stairway. Wood and coal storage room, 12 ft. x 12 ft., under dining room, entered by door under southeast corner of living room. Living room, also by door to cellar; no stone or brick foundation walls. Heights: Cellar, 7 ft.; first story, 9 ft.; second story, 8 ft. 2 in. Chimney, 8 in. x 8 in. inside, with fireplace in dining room. Holes for pipe to dining room, kitchen and south bedroom, also through wall in north bedroom and floor above the parlor, so that a heater could be placed in any room if desired. The parlor fronts the public park, north. The dining or living room, designed with a gable, was especially arranged for the view to Lake Shunaway, with Olympic Mountain range in the distance. The south porch affords a grand view to east and south. The view of the Cascade Range, with Mt. Rainier and St. Helens. The hall was designed with paneled work under stairs. Queen Anne interior woodwork in all rooms, and hard oil finish. Cost of cottage complete, about \$1,000.

Our plate was made direct from a photograph of the house, taken especially for the SCIENTIFIC AMERICAN.

## BRICKS OF GLASS.

A recent article in the *Brisbane* states that it is proposed to cast glass into molds and use it for building purposes. The originators of this idea have not hit anything very new or novel, as this has been tried before in many ways and at various times during the past hundred years or more. One difficulty which has always been found to play an important part in preventing the idea from coming into general use has been that the rate for expansion of ordinary fire glass is 0.0041 inch for 1° F. in 100 feet, while that for brick is but .00144 inch for 1° F. in 100 feet; in other words, a difference in temperature of ten degrees will increase 100 feet of glass brick to 100.414, while the same amount of ordinary brick would be 100.014, a difference of half an inch. In a wall this would first produce a series of cracks upward from the glass bricks, or if they were set in rows alternating with red or other brick, it would cause the loosening of the courses from each other, and finally so rack the wall as to make it dangerous.

To set any brick or other material into a wall differing widely from it in its expansion is a proceeding full of danger, and nowhere is it better exemplified than in the steel frame buildings being erected, where the architect has to calculate to a nicety the expansion and contraction of all materials used and make allowance for it. In some buildings where this has not been done carefully, the result is very apparent all around the frame, and leads to weaken the entire structure by withdrawing from it the support of the brick filling.—*Manufacturers' Record.*

## DRY-ROT.

It is generally stated that dry-rot consists of the thallus of *Merulius lacrymans*, or *Polyporus destructor*, two highly organized fungi, whose fructification is sometimes found upon rotten timber. But it is a great mistake to suppose that dry-rot belongs exclusively to those two species or that they are even the common origin of it; on the contrary, there is reason to believe that any of the fungi that are commonly found upon decaying trees in woods

are capable of producing dry-rot, and it is quite certain that one of the most rapidly spreading and dangerous kinds is caused by the ravages of different species of *Sporophthora*. The latter throw up from their thallus whole forests of microscopic branches loaded with reproductive spores of such excessive smallness that they may insinuate themselves into the most minute crevices or flaws even in the sides of the tubes of which timber consists, and they are infinitely more dangerous than *Merulius* or *Polyporus*, which seldom fructify. It was the genus *Sporophthora* that, above all others, was the cause of dry-rot in ships under repair at Sheerness. The circumstances that are most favorable to the development of the dry-rot fungi are damp, unventilated situations and a humid state of the wood. The latter condition, especially in oak, is easily produced by a slight fermentation of the sap which remains in the timber, especially if the latter has not been as well seasoned before being employed. It has been proved experimentally that fluids which, in their ordinary state, will not produce fungi generate them abundantly if ever so slightly acidulated. Dutrochet found that distilled water holding in solution a small quantity of white of egg will not generate fungi in twelve months, but upon the addition of the minute quantity of nitric, sulphuric, muriatic, phosphoric, oxalic or acetic acid it generated them in eight days' time in abundance. Alkaline infusions possess the same property. This observer also found that the only position in which will prevent the appearance of fungi are the oxides or salts of mercury. A solution of fish-glass yields fungi rapidly and in great abundance, but a small quantity of red precipitate or corrosive sublimate destroys this power entirely. It is, moreover, an important fact that neither

columns or beams, must be protected by brick, terra-cotta, or other incombustible material. Openings or doorways in party or partition walls cannot exceed two feet for each floor. These must be protected by double tin clad fire doors hung to iron frames, and the combined openings on any one floor cannot exceed 100 square feet.

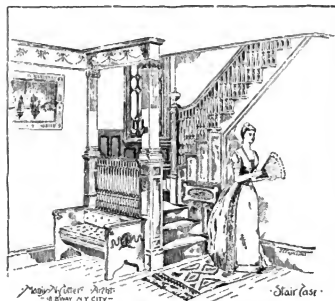
A summary of the principal requirements shows these five precautions:

In all new buildings all external parts above a height of 45 feet must be of brick, stone, metal, or other incombustible material. All outside openings on buildings, hereafter built or altered, except dwellings and office buildings, that are within 50 feet of an exposed opening, must have approved shutters put upon them. All receptacles for ashes, waste, and other substances liable by spontaneous combustion or otherwise to cause a fire, must be made of incombustible material. All buildings hereafter erected or enlarged, to be used as lodging houses, tenement houses, or dwelling houses of five stories or more in height, must have the basement and first floor entirely built of incombustible material, and in such building no closet can be constructed under the first story stairway. All shafts hereafter built for elevators, hoists, dummy waiters, lifts, light and ventilating shafts, or other shafts, must be constructed of, and, if they do not pass the upper floor, their tops shall be covered with incombustible material. Such shafts hereafter built for elevators must be of brick, at least eight inches thick, or of metal covered on both sides with at least one inch of metal, or of masonry on the metal, or with some other equally substantial, non-inflammable, non-conducting material. All inside elevator shaft openings must be furnished with metal covered doors. Every steam boiler in a building used for business purposes, or as a lodging or tenement house, must be enclosed in a fireproof room, shut off by fire doors from the rest of the building. All landings hereafter built within the building limits must be either constructed of non-combustible material, or masonry, or brick, or stone, or metal, or of any other approved material. Every building hereafter erected or enlarged as a hotel for the accommodation of transient guests, and containing more than 50 rooms above the first floor, must be entirely built of incombustible material.

## A RESIDENCE OF HANCOCK AVENUE, BRIDGEPORT, CONN.

We illustrate on page 39 a house for Thomas Youngs, Esq., located on Hancock Avenue, near Fairfield Avenue, Bridgeport, Conn. It is of modern design, provided with a large hall, open staircase, a parlor with a large corner bay window, and a bay window on the sitting room, a nice large dining room, with a kitchen large and spacious, with ample pantry and closet room. The foundation is of stone, with dark blue stone underpinning. The exterior is clapboarded and shingled, and has a large veranda across the front and one side, which adds greatly to the beauty and comfort of the house. The roof is slated with the best Bangor slate. The cellar is 7 ft. first story, 9 ft. 6 in.; second story, 8 ft. 6 in. The laundry is in the cellar, and the bottom is cemented and provided with coal bins, from the cellar to the attic. The interior is finished throughout with whitewash, except the kitchen, which is finished hard pine. There is a handsome mantel in the sitting room; two rooms finished in the attic; simple cozy room all through the house; large built-in range from the cellar to the attic. Provided with electric bells; heated by hot air. The house has all modern improvements, and was built for three thousand dollars complete. A. Murray Jenks, Bridgeport, Conn., architect.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.



STAIRCASE OF HOUSE AT ARLINGTON, N. J.

mineral preparation has any such properties. Dutrochet ascertained that other metallic oxides acted differently. Oxides of lead and tin hastened the development of fungi; those of iron, antimony and zinc were inert, and oxides of copper, nickel and cobalt, although they retarded the appearance of fungi, yet did not prevent their growth in the end. These facts confirm in a striking manner the statement of Mr. Kyan as to the impossibility of timber steeped in a solution of corrosive sublimate becoming a prey to dry-rot, so far as dry-rot is produced by a fungus.—*The Architect.*

## THE NEW BUILDING LAWS AT BOSTON.

On Saturday, July 16, the new building law of Boston went into effect, which contains many good features which are worthy of general attention. Boston has quite a number of hazardous large area risks, and under the new law no building, except wharf sheds and grain elevators, hereafter put up or enlarged within the building limits of Boston, can have a height of more than 70 feet or an area greater than 10,000 square feet, unless constructed wholly of incombustible materials. No building of more than 45 feet in height can hereafter be erected within the building limits, to be used above the first floor for mercantile, manufacturing, or storage purposes, which is not wholly constructed of incombustible materials, or with eight floors of splined or tongued and grooved planks of at least two inches in thickness. No building hereafter erected, except spires for churches, can exceed a height of 125 feet. Investigating the more important points in the new law, underwriters find that in brick, stone, or iron buildings all party and bearing walls must be brick, and must be plastered directly upon masonry or upon metal lathing, and all such walls must be carried through and at least one foot above the roof. All weight-bearing metal, either

veranda across the front and one side, which adds greatly to the beauty and comfort of the house. The roof is slated with the best Bangor slate. The cellar is 7 ft. first story, 9 ft. 6 in.; second story, 8 ft. 6 in. The laundry is in the cellar, and the bottom is cemented and provided with coal bins, from the cellar to the attic. The interior is finished throughout with whitewash, except the kitchen, which is finished hard pine. There is a handsome mantel in the sitting room; two rooms finished in the attic; simple cozy room all through the house; large built-in range from the cellar to the attic. Provided with electric bells; heated by hot air. The house has all modern improvements, and was built for three thousand dollars complete. A. Murray Jenks, Bridgeport, Conn., architect.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

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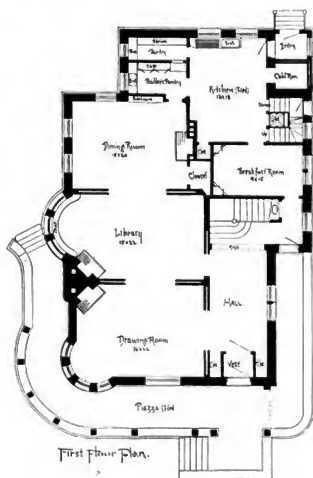
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RESIDENCE OF CHAS. E. DICKENSON, DENVER, COLO.—See Page 33.

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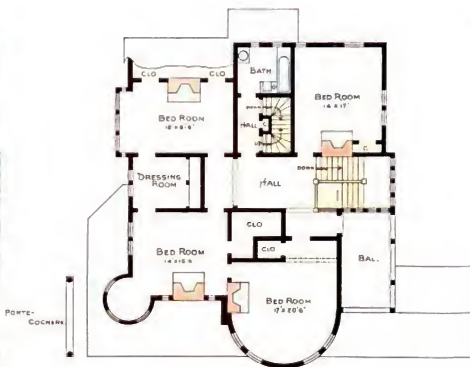


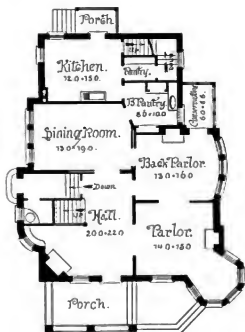
A RESIDENCE AT PLAINFIELD, N.J.



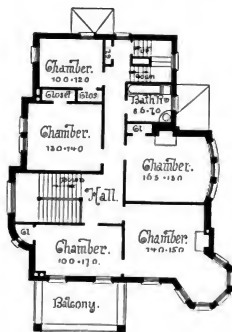


A RESIDENCE AT MONTCLAIR, N.J.



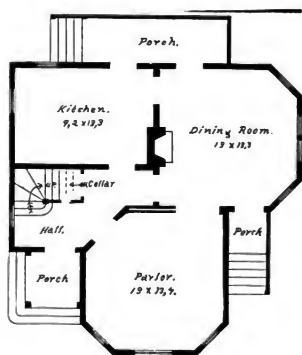


First Floor.

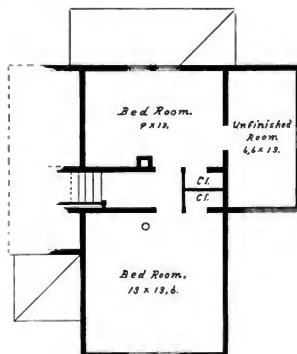


Second Floor.

RESIDENCE OF W. S. RAYMOND, ESQ., DENVER, COLO.—See Page 33.



First Floor.



Second Floor.

A HOUSE FOR \$1,000.—See Page 33.

## A HOUSE ON NORTH AVENUE, BRIDGEPORT, CONN.

On page 38 we give a plate of a house for F. E. Clark, Esq., located on North Avenue near Main Street, Bridgeport, Conn. It is of modern design, and is broken up with bay windows, porches, etc. The foundation is of hard stone and dark bluestone underpinning. The exterior is clapboarded and shingled, and has a No. 1 Bangor slate roof, and is painted dark red with chrome yellow trimmings. Cellar is 7 ft.; first story, 9 ft.; second story, 8 ft. 6 in.; with laundry in the cellar; cellar bottom is cemented and provided with coal bins, etc. The first floor is provided with a spacious hall with open staircase, and a parlor with a bay window, and a fireplace laid up with ornamental brick, and sliding doors between the hall and parlor and between the parlor and dining room, and a butler's pantry off of the dining room, and a nice

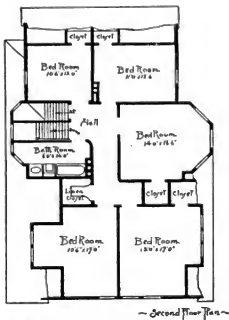
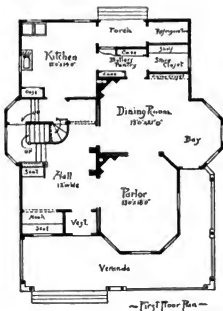
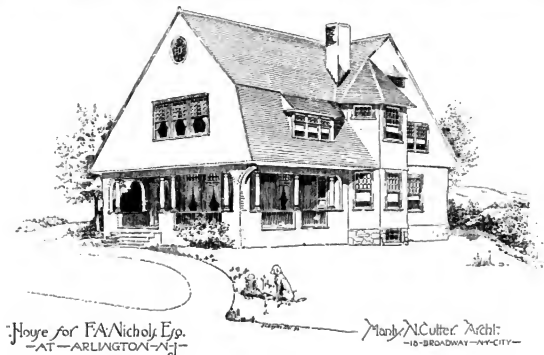
## A SUBSTITUTE FOR POPLAR NEEDED.

The growing scarcity of poplar box boards is bringing home to wagon manufacturers the necessity of looking for something to take the place of poplar for wagon box sides. With each succeeding year poplar is becoming more difficult to obtain, and while the price has not yet been materially advanced, the trouble in getting supplies and the expectation of being obliged to pay higher prices in the future have caused considerable inquiry with a view to discovering a satisfactory substitute. It will be perhaps impossible to find any other wood so well adapted for wagon box sides as poplar, but necessity knows no law, and already various woods are being used for this purpose, with more or less satisfactory results. The principal requirement is a wood that runs clear and wide, has lasting qualities

seems to be that it does not last well when exposed to the weather. This may eventually be overcome by some method of painting not yet discovered, but until then the search for a substitute for poplar will be carried further.

A dealer in yellow pine, of this city, claims consideration for the wood in which he is interested, and has recently sent out a number of specimens to wagon manufacturers, from which he expects to gather in a number of orders. This wood is used very largely for wagon box bottoms, and the dealer referred to sees no reason why it should not be as extensively used for sides. Failure to hold paint need not be urged against it, as it is claimed that this objection is overcome by using naphtha for mixing the paint instead of oil or turpentine.

All three woods mentioned are now selling at a lower price than poplar, and to that extent, at least, have strong



A HOUSE AT ARLINGTON, N. J.

large kitchen and pantry, and closet off of the kitchen. Three large bedrooms on the second floor, and a sewing room and bath room, with ample closet room, and one room finished in the attic. The house is finished throughout in white-oak, except the kitchen, which is finished in hard pine, in the natural wood. There are inside blinds to all bay windows, and outside blinds to all other windows. The house was built at a cost of \$1,900 complete. A. Murray Jenks, of 196 State Street, Bridgeport, Conn., architect.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

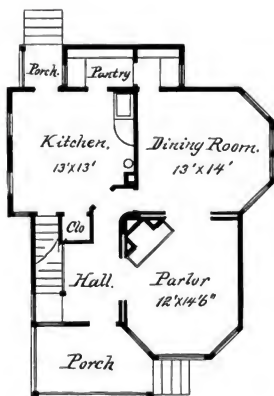
and will take paint well. The price is also an important consideration, and for this reason the choice is confined to the cheaper varieties.

In the latter respect cottonwood and basswood are on nearly an equal basis, and are now being used to a certain extent. Both of these woods fulfill three of the requirements named above, but are said to be deficient in one respect. Cottonwood was taken up a couple of years ago by one of the largest wagon factories in Indiana. Its use was discontinued for a time, but later resumed, and now this concern is reported to be using a considerable quantity of this lumber. The principal objection to cottonwood, and this will doubtless apply to basswood as well, is—N. W. Lambers.

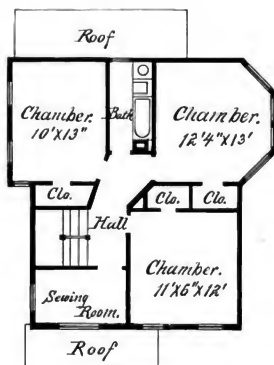
claims for consideration. Further than this they can hardly be compared with the latter wood for the purpose stated, but may be considered as available substitutes when the supply of poplar shall have finally become exhausted, or the price advanced beyond a figure at which it can be profitably used.

Cypress also furnishes good material for box boards, and in everything but price, probably has as strong claims for consideration as either basswood, cottonwood, or yellow pine. Whether or not the other advantages are overcome by the higher price asked for cypress, is a question for the users of the wood to determine to their own satisfaction.

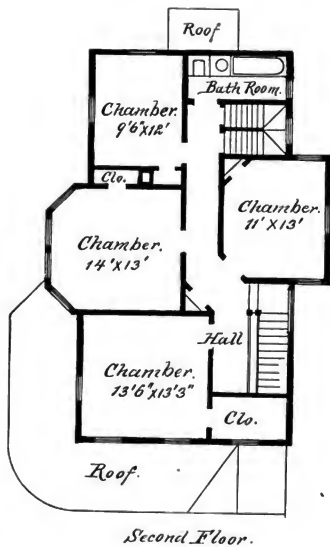
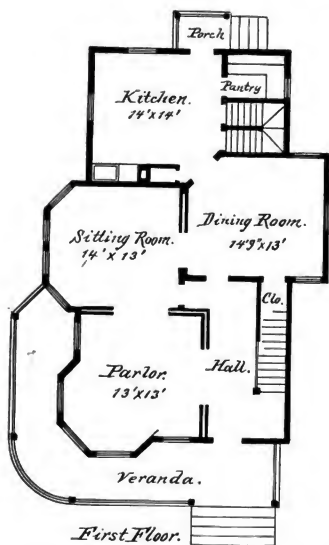




First Floor.



Second Floor.



A RESIDENCE ON HANCOCK AVENUE, BRIDGEPORT, CONN.—See Page 33.

## AN ENGLISH COUNTRY RESIDENCE.

We present on this page a modern English country residence of recent design, by Mr. Herbert Knight, architect. We are indebted to *The Architect*, London, for our illustration. The exterior is mainly of cream-colored plaster work, with brilliant red brick masonry and tiled roof. Such a house probably would cost about \$2,500 in this vicinity.

## THE PALACE CITADELS OF NINEVEH.

Neither the rude-Scythian hosts nor the combined forces of the Medes and Babylonians (the latter of which peoples were well skilled in siege operations) made any impression on the strong defenses of Nineveh, which fell at last only before a slight foundation of the river Tigris. But even when a besieging force had penetrated into the city it would have encountered other defenses of no small strength. The royal palaces were so constructed that they could be turned into citadels. They stood upon vast platforms, built of sun-dried bricks faced on all sides with solid stone, rising from sixty to eighty or more feet above the level of the plain. The platforms rose as high as the front of Charing Cross or Westminster Palace hotel, and

from the attacks of the gnats and mosquitoes to which their subjects were liable in the world below. Such vast platforms were usually the work of two or more sovereigns, each adding to the platform of his predecessor when he wished to erect a new palace for himself. Thus Ashur-iddanpal built a palace for himself on the level of the same platform upon which his grandfather, the mighty Sennacherib, had built his. In fact, during the later and more flourishing period of the Assyrian Empire each monarch built a palace for himself, and Esarhaddon built no less than three. The palace never occupied the whole of the summit of the platform, one-half of the level summit being usually laid out in open paved courts, sometimes with a zigzag or temple-tower occupying one corner of it. Nevertheless, as may be inferred from the vast size of the platform, the palaces were of great extent, embracing large halls of state, wide open courts and a vast number of lesser and chiefly private apartments. All the chief entrances or doorways of the palace were adorned on either side by colossal winged bulls or lions with the head of a man sculptured in fine limestone, and the chief halls and apartments were lined to the height of nine or ten feet with slabs of the same material, on which were

wall, and several in the width of wall." These borers are made through the vertical section, and on each side of the wall, and will reach below the footings into the strata beneath. Pipes are then placed in the bore-holes, and thick neat Portland cement grout is then passed through the pipes, or forced down, and this will fill up the crevices, rendering the foundation compact, and will cement the wall to the stratum of sand or gravel on which it is founded, and the stratum will also be cemented together or rendered firm for several inches, thus adding a new foundation course below the wall. A second modified stratum can be added below the first if necessary. The bore-holes may in some cases be bored in oblique directions through the wall, so that the foundations could be widened by this means. If the underlying stratum is of clay, or of a clayey nature, the author proposes, instead of forcing down cement grout, to force down the tubes "clay worked up with hydraulic lime, sand mixed with iron filings and all ammoniac, partly-set neat Portland or Medina cement concrete," such materials to be made up into convenient sized balls or rods, put into the tubes, and rammed down with a heavy ram or monkey worked by a hand, or steam-ringing, or pile-driving machine, so as to



AN ENGLISH COUNTRY HOUSE AT HAMPTON-ON-THAMES.

were a hundred times larger in extent. They were built in rectangular oblong along the side of the river, alike for the purposes of defense and for the cool air from the river, and the wide unobstructed view of the surrounding country which such a position afforded. To give roughly an idea of the extent of the larger of these palace-platforms, we may say: draw a line from the Thames at the Victoria Tower of the Houses of Parliament to the Westminster Palace Hotel, from thence across the Horse Guards and Trafalgar Square to St. Martin's Church, and thence back to the Thames along the eastern front of the Charing Cross Hotel, and imagine that the whole of this vast area was occupied by a platform rising perpendicularly to one unbroken front to the height of seventy or eighty feet. Such were the larger platforms upon which the Assyrian palaces were built. The palaces themselves appear to have been in the main, if not in all cases, one-storied buildings. Having obtained the magnificence and convenience of bright light means of the platform, the Assyrian monarchs did not rear their palaces in stages, wisely preferring the luxury of a wide extent of courts and halls and minor apartments all upon the same level. Doubtless, as it would in eastern countries, they would frequently repair to the level roof of their palaces to enjoy most fully the open air and the wide view, which they could do, owing to the height of their palaces above the plain, free

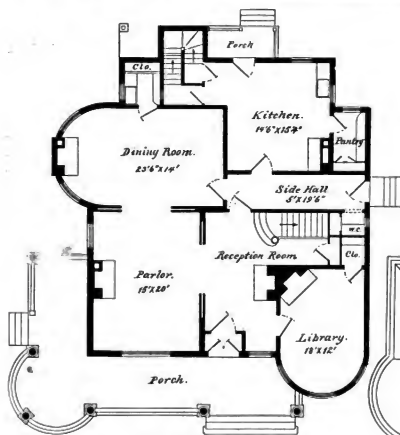
represented in color the exploits of the king who built the palace, with inscriptions detailing the events of his reign. And above these sculptured and colored bas-reliefs the walls were faced with enameled bricks all the way up to the roof of the halls, which were usually from seventeen to twenty feet in height. Beneath these lofty palatial mounds lay the common buildings of the city, which, if we may judge from the representation of an Assyrian town on a recovered bas-relief, were dome-shaped in the back, and lighted not from the sides but from the top, as the palaces also were in the main.

## UNDERPINNING BY BORE-HOLES.

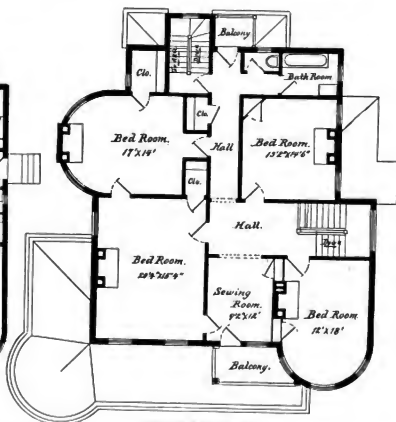
A very ingenious system of securing foundations of quay walls, bridge piers, reservoir embankments, and other structures from further yielding or sinking is proposed by Mr. Walter E. Knappe, M.Inst.C.E., in an article in *Engineering*. It consists of underpinning by means of grouting and stock-ramming, introduced through bore-holes or tubes, by which means the foundations are strengthened and widened, and the underlying strata made firmer. Mr. Knappe says: "Should the wall be founded on sand or gravel, all that would be necessary would be to put down a series of bore-holes, say, 3 in. to 6 in. in diameter at intervals along the line of

force the balls into the soft stratum, and consolidate it. By this means the foundation can be widened beyond the base of wall. After one layer has been deposited, the bore-holes can be sunk deeper and another layer added. This plan is called "stock ramming," and has many purposes, such as stopping leaks and underpinning. Mr. Knappe has used these methods with successful results. Other details are given in the author's article, to which we refer our readers. The method appears to us to be applicable also to the foundations of buildings which have settled, in which case the bore-holes would be made in an oblique direction on each side of the wall. As a mode of underpinning, the plan has advantages over the ordinary laborious methods, as it can be done expeditiously and without disturbing or removing the soil on either side of the wall. It may also with advantage be used, as suggested, for raising walls and factory chimneys, or for bringing them back to the perpendicular. — *Building News*.

The sand used for mortar in all buildings shall be clean, sharp and not finer than the standard sample kept in the office of the Superintendent of Buildings, which samples be approved by the Board of Examiners, and kept in suitable glass jars for the guidance of officers and inspection of the public.



First Floor Plan.



Second Floor Plan.

A CEMENTINE RESIDENCE ON WHITEMAN STREET, PITTSBURGH, PA.—See Page 42.

## A COTTAGE OF MODERATE COST.

We give on this page two floor plans and perspective sketch of a cottage, estimated to cost complete about \$1,300. It is a roomy, comfortable house. The plans appear to have been well studied. We regret we have not the name of the architect who designed them.

## RUINS OF JAVANESE ARCHITECTURE.

The architectural ruins of Java surpass those of Central America, says a recent issue of the *Home Journal*. At Chandi-Sewa are found the remains of what was once an assemblage of 296 temples, arranged in five parallel rows, one inside of the other. In the centre of all is a large temple in the shape of a cross, surrounded by 40 flights of steps, richly ornamented with sculptures and containing many apartments. Eighty miles to the eastward is the temple of Borobodo, consisting of a central dome 50 feet in diameter, around which is a triple circle of 73 towers, the whole building being 850 feet square and 100 feet high. In the walls are niches containing 400 cross-legged figures larger than life. The amount of human labor and skill expended upon the pyramids of Egypt sink into insignificance when compared with that which was required to complete this sculptured temple in the interior of Java. Forty miles southwest of Samarang, on the same island, is an extensive plateau covered with the ruins of temples, to reach which four stone stairways were constructed, each containing more than a thousand steps. Traces of more than 400 temples are found there, all of them decorated with rich and delicate sculptures. In Eastern Java the ruins of forts, palaces, baths, temples and aqueducts are to be seen everywhere.

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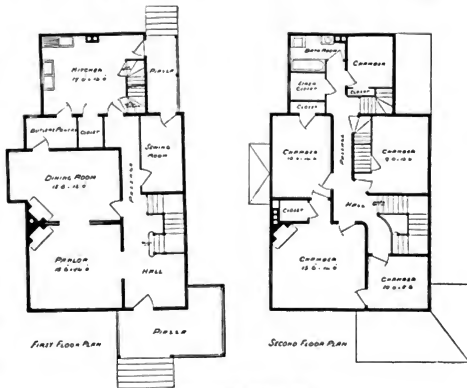
## MAKING WATER-TIGHT WORK BELOW WATER-LEVEL.

A correspondent of the *Engineering Record* deal with the above subject in a recent communication; the work in question being the reconstruction of some brick reservoir. The ground was sandy, and the flow of water was very strong, causing much trouble in making the work water-tight. The bottom of one reservoir consisted of an inverted arch built on concrete, and the water forced its way through the concrete before it could be set. On laying the courses of bricks, there was the same trouble; the water breaking through the joints before the cement mortar could set. To overcome this, a thin layer of mortar was spread over the concrete, on which a layer of tarred roofing paper was placed. The first layer of bricks of the inverted arch was laid on this paper, beginning in the centre and working both ways. When the sides of the reservoir were reached, the tarred paper was turned up, and afterwards built into the wall, until it was carried above the water line. The bottom was not fully water-tight after the first course had been put in, although the flow of water was very nearly stopped. The process was therefore repeated between the layer just put down and the one following, perfect tightness being thus secured. In another small reservoir the bottom consisted

of concrete, which, when laid, was made tight, except at one place. After the concrete had been put in, the reservoir walls were built, the water which came in through the opening in the bottom being constantly pumped out. When the walls were finished, the whole was laid under

straction. Cementine is a species of cement of great hardness, and when applied as in this case to building, forms an exterior covering of great durability. Any desired color may be applied to the material at the time of mixing. In the example here illustrated it has the appearance of red sandstone, and in some respects is actually better than if built of that material. The material termed expanded metal is made from a piece of steel, cut with the grain and pushed out or expanded into diamond-shaped meshes, so that the original surface is greatly increased. The direction of the edge undergoes a complete reversal, and the flat surface of the cut strand is at a right angle with the conditions originally existing. In order to secure these desirable qualities, it is necessary to use only a very soft, tough steel of fine texture. It is very much superior to wirework, as it presents its smallest surface as an obstruction to light, and its largest in the line of resistance to pressure. Each mesh is in dependence of all others, and numerous strands may be cut without materially weakening the sheet. It is impossible to unravel it, as it is welded at all points of intersection. The oblong mesh is peculiarly adapted for plastering. Our cut shows the form of the mesh. The house here illustrated and the mode of construction when the expanded metal lathing is used for frame houses is as follows: Erect a studded frame as if the usual weather-boarded house was to be constructed, covering the studding with rough sheathing; cover this sheathing with paper (stiff oiled roofing is the best, the cost is small); over this place common wood lath, nailing to the sheathing, in a vertical position, at a distance of 12 or 16 inches apart. On this securely fasten expanded metal lath. A cement mortar is then applied, and finished to represent whatever style of finish or design the taste of the builder or architect may suggest. Smooth plain troweled work, pebbled dash, stippled or more elaborated designs, imitations of rock-faced stonework, picked, hammered or rubbed, regular and irregular range work, random range work, etc., have been made so exact that it is difficult, if not impossible, for the ordinary observer to detect the clever deception. The amount of ornamentation with this material is only limited by the taste of the builder, or possibly his willingness to pay the cost. When economy is the important factor in construction, the sheathing may be omitted, fastening the metal lath directly to the studding. By this method the wall would not be rigid as in the former, but in other respects equally as good. On the inside, the expanded metal lath is applied direct to the studding, and then plastered.

Further information may be had by addressing J. K. Combs, manager, 85 Chambers Street, New York.



## A COTTAGE OF MODERATE COST.

turbed for some time, with the water standing in the reservoir, in order to give the concrete a chance to harden thoroughly. The reservoir was then pumped out, and it was attempted to stop the leak in the bottom—first with strong mortar, then with pure cement, and then with plaster of Paris. Finally, a mixture of oakum and cement was tried, but it proved equally inefficient. At last a suggestion was made to drive a tube in the opening, just deep enough to catch the water coming in. This was done, and a common section pump was hitched on. The scheme of thus keeping the water from rising proved entirely successful.

## A CEMENTINE RESIDENCE AT PITTSBURGH, PA.

On page 41 we give a photographic plate and floor plans of a handsome residence on Whittman St., Pittsburgh, Pa., the peculiarity of which is that the exterior is composed of cementine, supported on expanded metal lathing, and the interior plastering is also supported on expanded metal, making altogether a house of slow burning con-

tations of rock-faced stonework, picked, hammered or rubbed, regular and irregular range work, random range work, etc., have been made so exact that it is difficult, if not impossible, for the ordinary observer to detect the clever deception. The amount of ornamentation with this material is only limited by the taste of the builder, or possibly his willingness to pay the cost. When economy is the important factor in construction, the sheathing may be omitted, fastening the metal lath directly to the studding. By this method the wall would not be rigid as in the former, but in other respects equally as good. On the inside, the expanded metal lath is applied direct to the studding, and then plastered.

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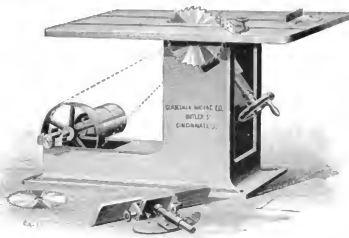
The engraving represents a standard circular saw bench, made from new patterns, and designed for accurate and special work in carriage, pattern, furniture, moulding, and picture frame factories. The frame, with extension and bearings that support the counter shaft, is cored out and cast in one solid piece, and has a substantial floor support, thus giving the machine greater strength and rigidity than if it were cast in separate pieces. The iron table is well braced, and measures 2½ feet wide by 4 feet long. The standard is made of the best machinery steel, and with its pulley is truly turned and balanced. It runs in long boxes lined with genuine Bobbitt metal. The frame carrying the standard and saw can be quickly raised or lowered by the screw and hand wheel at the front end of the machine. The tight and loose pulleys are 8 in. diameter by 4 in. face, and should make 600 revolutions per minute. For prices and further particulars address the Cordeman Machine Co., 34 to 34 Butler St., Cincinnati, O., U. S. A.

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## AN IMPROVED FIREPLACE FURNACE.

The illustrations show the Jackson ventilating grate, modified and improved so that it forms a substantially new apparatus, in which is applied the principles of the old grates so long and invariably known under this name. In the funnel-shaped fire pot, the portion above the line, B D, serves as a basket to hold the fuel, the ashes passing through the spout, C, to the ash pit, F, and the line, B D, representing rocking grates, by means of which the fire is readily kept clear. The fire pot is completely enclosed by an air chamber, to which is a cold air inlet, and from the top of this chamber lead the pipes, N, over and back of the fire

to a hot air chamber above, in front of which is a register, through which the heated air passes into the room. A hot air pipe, S S, also leads from the hot air chamber through the smoke flue into a register box, W, adapted to heat a room above that in which the grate is placed. With this arrangement an open fire may be made, level with the hearth, and the form of the furnace does not interfere with the artistic



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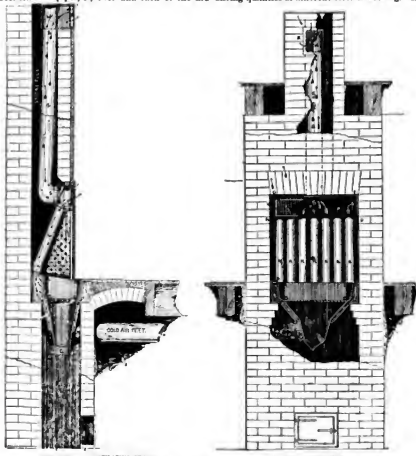
## Fireproof Flooring.

A building inspector in Hamburg recently made a series of experiments to test the comparative fire-resisting qualities of different sorts of flooring. He con-

structed eleven pieces of flooring, all of pine, unplanned. The floor was double in every case, save the first, and the boards ranged from 1½ inches to 2½ inches in thickness. The first floor, of single boards, burned through in thirty seconds. Then, for the second and third experiments, the floor was doubled, the joists running the same way; two layers of asbestos paper were placed between the second piece of floor, and "superator" (probably thick asbestos felt) between sample three. The second burned through in one hour and four minutes, and the third in one hour and thirteen minutes. The fourth and fifth samples were double floors, which resisted well. The sixth floor was like the fifth, save that the joints crossed each other at right angles. This floor required an hour and twenty-two minutes to burn through, the crossing of the joints being more effective than the asbestos or superator between the boards, and the resistance in each case was prolonged somewhat. Ordinary roofing felt was placed between the boards in the tenth piece, and it resisted an hour and twelve minutes. In the last piece the upper floor was of matched inch boards, and the under planks, 2½ inches thick, with square joists running at right angles with those of the upper flooring. Nothing was put between the floors, but the resistance was two hours and twenty-four minutes.—London Carpenter.

## ARTISTIC ELEVATOR ENCLOSURES.

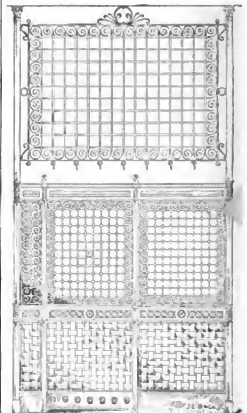
Our illustration shows the high excellences which fine metal work has reached in the line of elevator enclosures. The people want new and artistic designs. The work must be artistically built, and finished according to the most advanced methods. J. E. Bolles & Co., Detroit, Mich., have just published their catalogue No. 11, which contains a series of original and attractive designs, and it is from this that our illustration is taken. This company gives special attention to artistic elevator enclosures, cars and similar work. They also make the most modern work for banks, artistic steel grilles, iron stairs, etc. Those interested in such work will do well to send for this company's latest catalogue. They state that they are now filling a large order for the elevator enclosure and stair railing for W. P. Callahan's elegant eight-story office building at Dayton, Ohio, Williams & Otter, architects. They have just shipped a car load of iron stairs for the Stephenville Court House, Texas, Jordan & Lamb architects, San Antonio; a complete set of bank fixtures for the State Bank of Perry, Mich.



SIDE VIEW OF VENTILATING GRATE.

THE JACKSON FIREPLACE FURNACE.

SECTIONAL FRONT VIEW.



ARTISTIC ELEVATOR ENCLOSURES.



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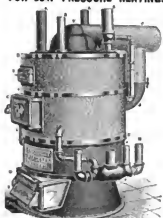


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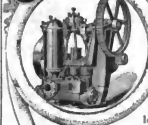
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ELEVATORS,  
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## Notes and Queries.

(1) F. W., Chicago, writes: Will you  
please suggest some way to me through the SCIENTIFIC  
AMERICAN of removing or lowering the dampness in  
my basement? It costs my wife, quite everything I  
can do there, and the treatment order makes it very  
annoying. A. The only approved way of removing the  
moisture of dampness in Chicago will be to make a  
concrete floor with Portland cement, using gravel or  
sand, with the cement at least 2 inches thick, and plaster  
the walls 2 to 3 feet high all round, with Portland ce-  
ment. Then cover floor and sides with a thin coat of  
sashput put on hot. There lay a floor so as to have a  
slow space underneath and arranged to connect with  
near air through ventilators. Sides of basement to be  
formed off, labeled and plastered. You have parties in  
Chicago that do this work.

(2) K. N. asks: How many cubic feet  
or boardfeet of ice is needed to cool a space of  
1,000 cubic feet of an ice box (closed throughout with a  
surface nearest to about 40° F.) A. The melting of  
300 pounds of ice should be enough to cool the ice box  
to 40° from our summer temperature, if it is perfectly  
tight; but as no house is perfectly tight and sealed,  
a constant removal of from 300 to 400 pounds of ice is  
not too much.

(3) "Inventor" asks: 1. What acids  
have the effect of setting upon or softening granite or  
other stone, or what acids would give the best results  
before the ordinary drifter? A. No acid has this effect  
to a sufficient extent to be of any practical value. The  
most blast and McQuay's pneumatic acid are of value.  
For the former, see SCIENTIFIC AMERICAN, 4th; later, see  
SCIENTIFIC AMERICAN, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th, 35th, 36th, 37th, 38th, 39th, 40th, 41st, 42nd, 43rd, 44th, 45th, 46th, 47th, 48th, 49th, 50th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th, 59th, 60th, 61st, 62nd, 63rd, 64th, 65th, 66th, 67th, 68th, 69th, 70th, 71st, 72nd, 73rd, 74th, 75th, 76th, 77th, 78th, 79th, 80th, 81st, 82nd, 83rd, 84th, 85th, 86th, 87th, 88th, 89th, 90th, 91st, 92nd, 93rd, 94th, 95th, 96th, 97th, 98th, 99th, 100th.

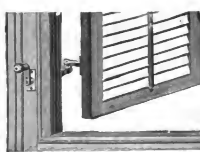
What solution should be used to give the best re-  
sults. A. Use dilute strong acid with the best volume  
of water.

(4) T. B. W. writes: 1. Give a simple  
method of determining the purity of the so-called dry  
white lead and lead in oil on the market. A. Dry  
white lead should be completely soluble in nitric acid.  
If ground in oil, the oil may be removed by benzene  
before treatment with acid. 2. With best applied  
to white lead in oil water the lead to be better im-  
mature? A. It will more or less completely, de-  
pending on the percentage of the oil present. 3. If so,  
what proportion of lead should be gotten from same? A.  
No exact proportion can be given. White lead it-  
self varies in composition, and the oil may be of dif-  
ferent proportions.

(5) E. J. G. says: I wish to put in  
floors and both rooms. We have an sewerage system.  
Would there be any objection to using a well for the  
sewer pipe to discharge into? If properly covered? It  
being about 20 feet deep and not closer than 200 feet  
from any other well? A. It would be dangerous to  
use the well as a receptacle for sewage. It would be  
likely to poison the neighboring wells, perhaps within  
a radius of half a mile or more. The safer way will  
be to make a tight cistern, for the sewage contents, to be  
emptied and taken away periodically.

(6) C. H. B. asks: Will you kindly  
advise a constant meter which is the proper way to  
lay a bell joint water pipe? I should the bell joint  
toward the pump and against the pressure or point the  
opposite way? There is a right and a wrong way. Will  
you kindly give me the correct way? A. The practice  
is long time to lay the pipe and down stream or  
down hill. The bell and against the direction of flow  
or toward the pump. This is not always practicable in  
short lines with low and crosses. Hence con-  
siderations of making joints to flow considered. In vertical  
lines the bell and must always be up.

(7) W. J. C. asks (1) How to remove  
rust from dirty polished steel, (2) a striking instru-  
ment, etc. A. Polish the rust from steel articles  
(Continued on page vi.)



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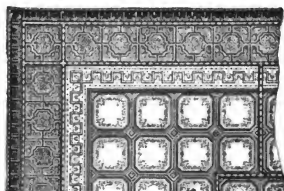


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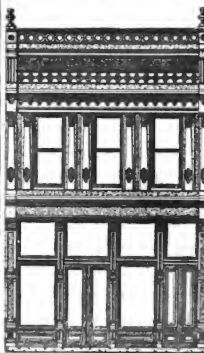
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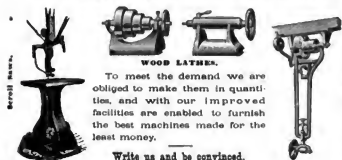
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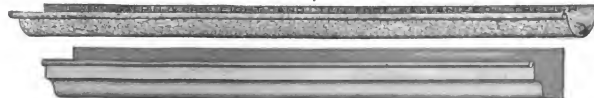
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(Continued from page viii)

(15) I. A. wants a very deep black, and has been informed that French black is the blackest of all. He cannot obtain it, and asks how it is made. A. It is made in Germany, from the vine branches and other refuse of the vine culture, the charcoal is made from wood. There is, however, a better black now, the entire black, about which draughtsmen agree that it is the blackest black known.

(16) R. M. wishes to know what is best to make more impervious waterproofing. The best is to wash them in a solution of sodium tungstate in this is ammonium phosphate, also calcium arsenate and calcium chloride, several papers described in terms their weight of water; also solution of alum, or borax, sodium sulphate, and boracic acid, or a mixture of the last four have been recommended, as preventing change of color, and not stiffening the texture after drying.

(17) B. C. S. says: Kindly give the largest of the two highest towers and clearest of the world. A. Eiffel tower, 1,200 feet; Washington monument, 555; Colosseum Ostia, 151; St. Nicholas, Hamburg, 171; Strasbourg, 465; Spire Tower, Bremen, 461; St. Peter's, Rome, 451; large pyramid, Cairo, 430; St. Stephen's, Vienna, 460; second pyramid, Cairo, 448.

(18) W. A. R. asks how to give a bright brass about the appearance of old brass. A. A simple way is to wash the article with vinegar, and expose it to the vapor of ammonia, and repeat this until satisfactory, or boil it in a solution of copper nitrate, or immerse it in a solution of iron nitrate and hypophosphite of soda in eight parts of water.

(19) R. M. McG. asks for a so-called weather paper for a window pane. A. By glazing the window pane or wall paper with any one of the following solutions, different colors are exhibited upon atmospheric exposure, owing to the well-known properties of alkalis and alkali salts, which change color in accordance with the variation of amount of moisture in the air. No. 1. Cobalt chloride 1 part, gelatine 1 part, water 100 parts. No. 2. Copper chloride 1 part, gelatine 10 parts, water 100 parts. No. 3. Cobalt chloride 1 part, gelatine 10 parts, water 100 parts, colored oxide of iron 1/2 part, copper chloride 1/2 part. In damp weather all will be colorless; in clear weather No. 1 will be blue, No. 2 yellow, and No. 3 green.

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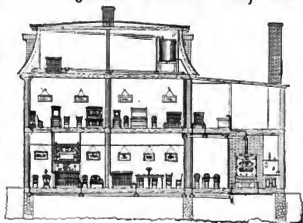


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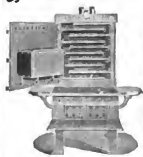
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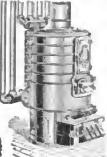
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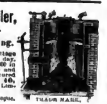


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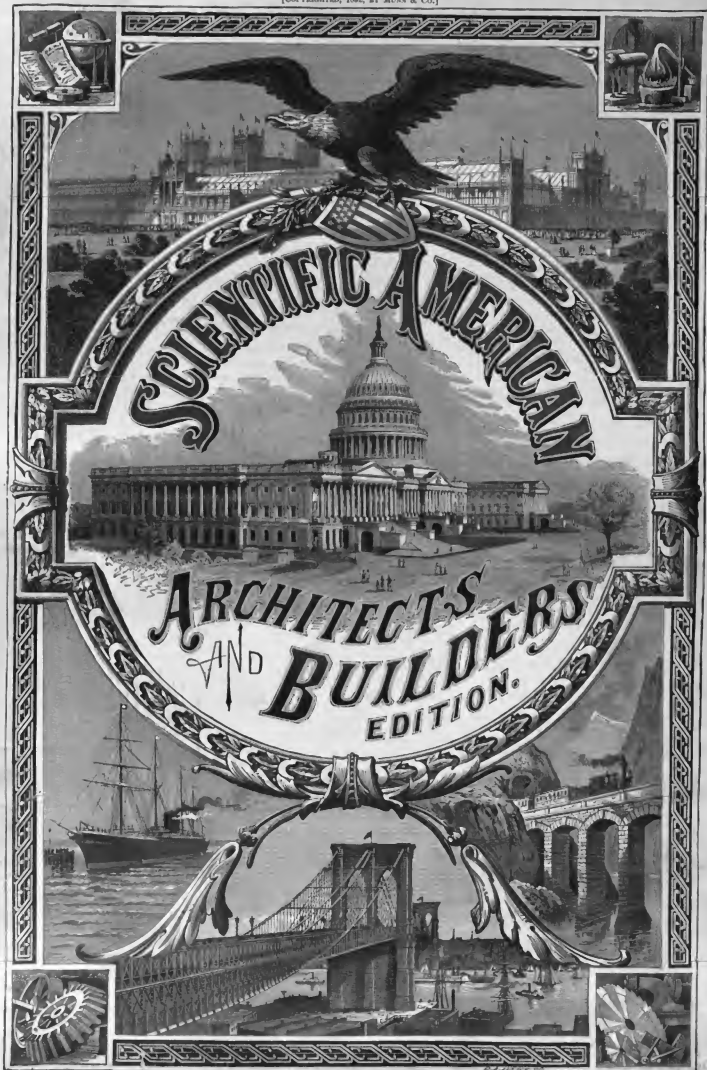
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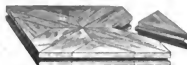
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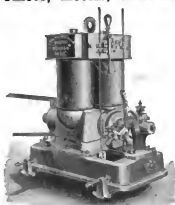
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No. 4.



THE CHURCH OF MORET-SUR-LOING.—Drawing by M. Saunier.—From "Le Monde Illustré."—See Page 48





## A HOUSE AT MONT CLAIR, NEW JERSEY.

Our plates on pages 49 and 51 illustrate a dwelling erected for D. F. Merrill, Esq., at Mont Clair, New Jersey. The design has a very quaint and picturesque appearance. The pleasant porch, bay and dormer windows in roof, are the principal features of the exterior. The underpinning is built of rock-faced red sandstone. The building above this underpinning is shingled, papered, shingled and stained a dark grayish color (black) with white trimmings. Roof shingled and finished natural. Dimensions: Front, 23 ft. 6 in.; side, 22 ft. 6 in., not including front porch.

Height of ceilings: Cellar, 7 ft. 4 in.; first story, 9 ft.; second, 8 ft.; third, 8 ft. The interior throughout is trimmed with white pine; the first story finished natural. The doors and windows have molded casings with caps. The hall room is the principal apartment, and it has a paneled wainscoting five feet high, with a recessed space between is filled in with spindlework. The staircase is a very pleasant one, it having a bay window thrown out at first landing, and provided with a rack. The neck is provided with acacia and fireplace, furnished with tiled hearth and facades, and a wood shelf. Circular arches are provided at openings into dining-room and above, the latter fitted up with book shelves. The dining-room is spacious and well lighted. The butler's closet is fitted up with shelves enclosed by glass doors, and paneled doors beneath counter shelf. Kitchen is wainscoted with narrow headed staid, and it is furnished with sink, fireplace for range, dresser and store pantry. The floors on first story are laid with yellow pine in narrow widths, and finished natural with linseed oil. The architect has presented a unique idea by hanging the four paneled doors upper side down, giving a quaint effect. There are four bedrooms, large closets and bathroom on second floor, and three bedrooms, large hall and storage on third floor. The trim in these apartments is treated with colors in a delicate manner. Bathroom is wainscoted and furnished elegantly. Cemented cellar, contains furnace, laundry, cold cellar store room and other necessary apartments. Cost \$4,120 complete. Mr. Edward T. Haggood, architect, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE ON CRYSTAL HILL, MOUNT VERNON, N. Y. We illustrate on page 50 a very attractive "Queen Anne" cottage that has recently been completed for H. W. Williams, Esq., on Crystal Hill, Mount Vernon, New York, and at a cost of \$5,000. W. F. Stickles, architect. The dimensions: Front, 32 ft. 6 in.; side, 34 ft. 6 in., including piazza. Heights of ceilings, first story, 10 ft. 6 in.; second story, 9 ft. 6 in. The foundation is of stone with underpinning of brick. The first story is covered with clapboarding, while the second story is covered with shingles. The roof is slated, and is finished with a terra-cotta cresting. The generous hall is trimmed with ash, and it contains a very pretty staircase with cast-iron on novel, and a window glazed with stained glass. The parlor is trimmed with cherry, while the dining-room has trim similar to hall. The kitchen, which is trimmed and wainscoted with North Carolina pine, is entirely separated from the rest of the house. There is a range in fireplace, and plenty of shelves, drawers and cupboards in pantry. The fireplace are provided with tiled hearths and handsome hardwood mantels. The second floor contains three bedrooms, den and bathroom. These rooms are trimmed with white oak, finished in oak; they are provided with

clothes closets. The bathroom is fitted up in the best possible manner, the plumbing being of the best description. There are two rooms in attic, and one store room. The house is provided with furnace, electric bells, speaking tubes, etc.

Our engraving was made direct from a photograph, taken specially for the SCIENTIFIC AMERICAN.

## ENGLISH COUNTRY HOUSE.

Our illustrations on this page represent two handsome residences of recent construction. One of them is a dwell-



DWELLING FOR ARTHUR CHAPMAN, ESQ., CROOKSBURY, FARNHAM.

ing at Ditton Hill, for W. H. Hutchinson, Esq., J. Nixon Bondfield, architect, Kingston-on-Thames. The ground story is built of red bricks and the upper story of light stocks with red dressings, whilst the gables are plastered. All exterior woodwork, except window frames, is of oak, merely oiled, and the roofs are covered with Bosceley tiles. The house has a light, dry basement, and on the ground floor a large hall, three entertaining rooms, billiard room, kitchen, and many offices; and on the upper floors a spacious landing, with about twelve bedrooms. The interior is executed principally in pitch pine, varnished. The conservatory and greenhouses are excellent.

yet the cost of the paper is so slight that no one would object to it. Indeed, no one who knows its value would ever build without it, but, unfortunately, few houses are so built, which is all the worse for the occupants of the many.—N. W. Builder and Decorator.

HOUSE MOVING.—A house moving took place recently between Allegheny and Pittsburgh, Pa. The building is a long frame structure consisting of four separate dwellings, originally three stories in height, 190x4 feet, and containing 84 rooms. In the process of removal the lower story was cut away, and the number of rooms remaining in the two stories is 48. The building was erected three years ago at a cost of \$41,000, and about two years later was sold to the Pittsburgh & Western Railway Company for \$35,000. The price paid for the dwelling, together with four others a short distance away, by the person removing them was \$450. For the purpose of towing this building across the river six barges, 125x6 feet were secured. These were placed side by side extending about 95 feet into the river. Then by the use of powerful hydraulic jacks and large rollers the building was moved to the river bank, and after being blocked up to a distance of 22 feet above the water, was rolled on to a massive trestle work resting on the six barges, which had been securely chained together. The low boats were then secured, which successfully towed them to the Pittsburgh shore. One particular feature about the removal that needed every precaution to warrant its success, was that it was necessary, after the building had been blocked up to a certain height and shored on to the boats, that it be raised to a height of 22 feet above the landing on a level with the Pittsburgh shore. In our number for March, 1892, we gave illustrations of the moving of a dwelling house by water, from Stratford, Conn., to Bridgeport, a distance of 18 miles.

TEMPERING TOOLS.—For tempering small tools there seems to be nothing more convenient than the flat iron burner in any of its most approved forms; it is a handy method, and avoids the heat and nuisance from a red fire.



DWELLING FOR W. H. HUTCHINSON, ESQ., DITTON HILL.

The other engraving is from a drawing by A. N. Patterson, exhibited at the Royal Academy. It represents the dwelling of Arthur Chapman, Esq., Crooksbury, Farnham. Edwin L. Lutyens, architect. We are indebted to the architect for our illustrations.

## HOW TO KEEP THE HEAT IN SUMMER AND KEEP IT IN IN THE WINTER.

It is quite as important to build a house so as to keep out the heat in summer as to keep it in the winter. Few architects seem to think of this point, and it is quite common to hear one say that a poorly built house is a cold

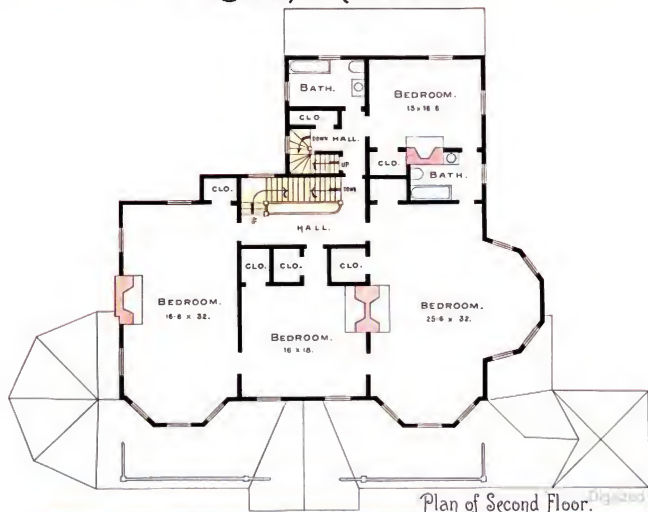


A HOUSE AT MONT CLAIR, N. J.—See Pages 47 and 51.

u 14



A COLONIAL RESIDENCE.



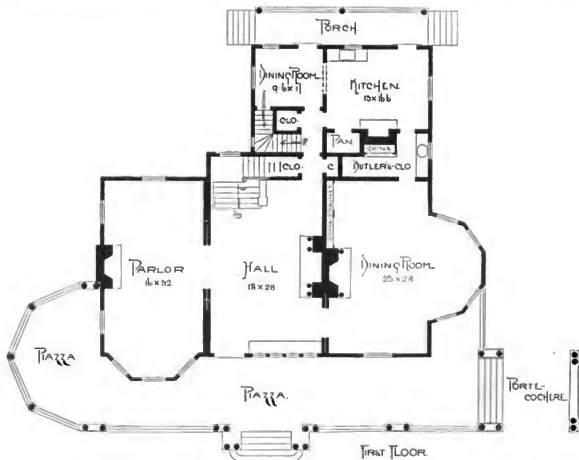




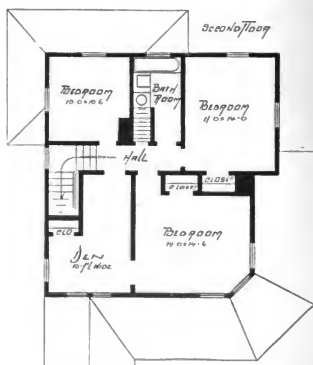
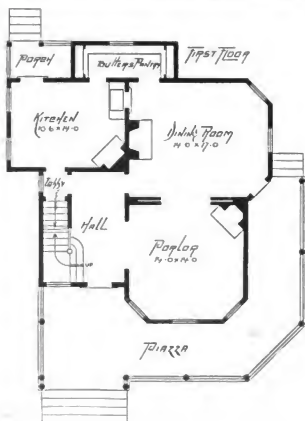
A HOUSE AT MONTCLAIR, N.J.







NIAL RESIDENCE.—See Page 46.



A COTTAGE ON CHESTER HILL, MOUNT VERNON, N. Y.—See Page 47.

## A HOUSE FOR TWO FAMILIES.

The engraving, page 52, illustrates a two family dwelling, erected for Mrs. E. C. Washburn, on Armorey Hill, at Springfield, Mass. The design is excellent. It is of the Old Colonial style of architecture, and it has a pleasing exterior with "swell" bay window, piazza and veranda. The plans present a unique arrangement for a two family house, each apartment being entirely separate from the other. The underpinning is built of local brick laid in red mortar. The building above is clapboarded and painted Colonial yellow with white trimmings. Roof shingled and finished natural. Dimensions: Front, 35 ft.; side, 67 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft. 6 in.; third, 8 ft. 6 in. The interior throughout is trimmed with whitewood. It is treated in the Colonial style, the halls painted cream white, while the parlors and libraries are finished in China white. The parlors have open fireplaces, furnished with tiles of a neat design and mantels with columns, mirrors, etc. The dining-rooms are trimmed

trimmings. Roof shingled and painted red. Dimensions: Front, 30 ft. 6 in.; side, 54 ft. 6 in., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft. 6 in.; third, 8 ft. 6 in. Cemented cellar contains furnace, laundry and other necessary apartments. Vestibule and hall are trimmed with antique oak. Vestibule has a tiled floor. Hall has connection with all the principal rooms in first story, and it contains an ornamental staircase, with carved newels, etc. This hall and staircase are lighted effectively by windows glazed with delicate tinted glass. The den is trimmed with antique oak, and the parlor and library with cherry; the latter contains an open fireplace, furnished with a tiled hearth and facings and a hardwood mantel. Dining-room trimmed with oak, contains a paneled wainscoting and a buffet built in and neatly carved. The staircase in rear hall is a private one from cellar to third floor. Kitchens and pantries are trimmed and wainscoted with Georgia pine, finished natural with hard oil. These apartments are furnished complete in the best possible manner. The

THE CELL OF A VESTAL HERMIT.—During some building changes in Utrecht, writes the *Vonische Zeitung*, an interesting discovery was made under the so-called Burkerk. The well-defined ruin was found of the stone cell in which, in the year 1557, the richest and most beautiful girl in Utrecht had allowed herself to be immured. The historical facts are as follows: On May 4, 1557, a mystery-play was performed in the cathedral, and among the spectators was Bertke, the beautiful daughter of the Provost. But instead of the expected sentimental feelings she experienced only vexation and disappointment, and was especially indignant at the sexton calling out, before the play began, that the young men in the church were "not to tickle the young girls, or pinch their calves, on pain of being expelled the church." Still more disgusted at the conversation of some women standing near, Bertke left the church and told all she had heard to her father confessor, who confessed that the slander cast upon the priests was often too true. This was enough for Bertke, who, convinced that not even the cloister could



A HOUSE AT MONT CLAIRE, N. J.—See Pages 47 and 48.

with oak, and they have similar fireplaces fitted up with oak mantels. Butlers' closets are fitted up replete. The kitchens and pantries are trimmed and wainscoted with whitewood, finished natural. Each apartment is furnished with the usual fixtures, in the best possible manner, respectively. The bedrooms are well lighted and provided with closets. There are three bedrooms and trunk room for each family, on third floor. The cemented cellar is divided, and each contains furnace and laundry, besides other necessary apartments. Cost \$7,000, exclusive of plumbing and heating. Mr. F. R. Richmond, architect, 51 Fuller's Block, Springfield, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

## A DWELLING AT HOLYOKE, MASS.

Our engraving, page 53, illustrates a model dwelling erected for Mr. M. C. Frazier, at Holyoke, Mass. The design is unique; the lines are well broken, giving it a neat and tasty appearance. The underpinning is built of local rock-faced bluestone. The exterior framework is sheathed, papered and then covered with clapboards and shingles. It is painted olive green, with bottle green

second floor is trimmed with white pine, and is treated with colors in a delicate manner; it contains five bedrooms with large closets and bathroom. Bathroom is wainscoted and fitted up replete. Two bedrooms and billiard room on third floor.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

## A COTTAGE AND SEPARATE SUMMER KITCHEN.

Referring to pages 54 and 55, the main house is 16 ft. x 38 ft.; porches, 14 ft. x 34 ft., as shown. Roofs of tin. Two east rooms mahogany finish; two west rooms wain coat in oak, and finished in oak; inside blinds, and finished complete. Attic unfinished, but could be finished with two nice bedrooms. A 7 ft. cellar under main house; cemented floor. The addition or separate summer kitchen stands on stone posts. The house and outbuildings are heated and lighted with natural gas throughout.

Mr. J. M. Walker, of New Bethlehem, Pa., who built these houses, says: "We think this plan the model for comfort and convenience for two persons—we mean poor people." The cost of both buildings, about \$1,600.

Our engravings were made direct from photographs of the building, specially taken for the SCIENTIFIC AMERICAN.

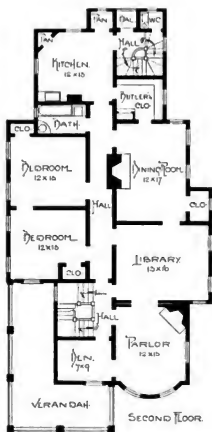
keep her secure from evil, determined to cause herself to be walled up in a special cell with only a small aperture for the reception of food. No one knows how she died, but it is certain that she lived in her cell for fifty-seven years—that is, till 1514.

R. J. C. asks: "Would you give me a receipt, something simple, for making natural wood antique, especially oak?"  
Ans.—A weak solution of sulphate of iron in water is used for a dark color, but requires a little practice by wiping the solution on a trial piece. A safer way for an amateur is to use burnt umber in turpentine, when you can tone the depth of shade to your taste.

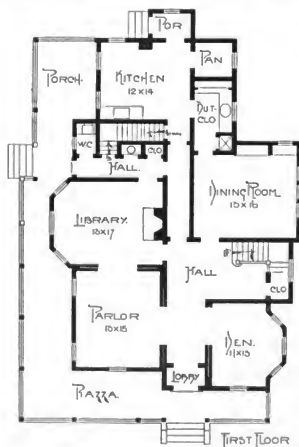
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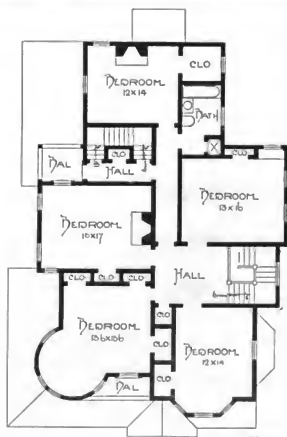




A HOUSE FOR TWO FAMILIES.—See Page 51.



FIRST FLOOR



SECOND FLOOR

A DWELLING AT HOLYOKE, MASS.—See Page 51.

## THE PANORAMA AT MONT CLAIR, NEW JERSEY.

Our engraving, page 36, illustrates the Panorama built for the Congregational Church at Mont Clair, N. J. Dimensions: Front, 42 ft.; side, 50 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second story, 9 ft. 6 in. The foundation is built of stone and the underpinning of "quarry faced" brown stone, laid at random in red mortar. The chimneys are topped out with buff brick. The exterior framework throughout is sheathed, parged and then covered with shingles. The roof is also shingled. The hall is spacious and inviting, and is well lighted with windows glazed with stained glass, rich in coloring and design. This hall is trimmed with butternut, and contains a pretty staircase with carved newels, etc. The ceiling has a wood cornice. The drawing room is finished delicately in cream and gold, and is provided with a pretty, open fireplace with tiled hearth and mantel. The library is trimmed with cherry; the window seat is cut down to floor and open out upon piazza. The open fireplace in library and elsewhere, where shown, are fitted up with artistic tiled hearths and elegant hardwood mantels. The dining-room is trimmed with butternut similar to hall. The rest of the trim throughout is of hardwood, finished in the natural. The doors are of hardwood polished, and laid in narrow shingles. The master's pantry is properly fitted up with cupboards, drawers and sink complete. The kitchen is wainscoted with narrow beaded stool, and is provided with large pantries, sink, etc. There are four large bedrooms and bathroom on second floor. The bathroom is large and airy, and is provided with bathtub, water-closet and wash bowl; the plumbing is of the best description. There are four bedrooms and study in third story (attic) complete. There is a cemented cellar under whole of house; it contains laundry. The house is heated by a hot water system, and is provided with electric bells, speaking tubes, etc. Cost complete \$15,000. J. C. Cady & Co., architects, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

## A RESIDENCE AT SOUTH ORANGE, N. J.

The perspective on page 57 represents a very large mansion house, that has been built lately for Mr. Miles, at South Orange, N. J. The materials are good, the construction substantial, with numerous desirable features, such as a broad piazza that runs around three sides of the building, pretty dormer windows in roof, chimneys that run high and so distributed as to give open fireplaces to all the principal rooms; there is also a balcony on second floor that is enclosed with a fine wire mesh; the first story is covered with beveled white pine clapboarding, while the second story is covered with shingles and neatly laid panels, all being painted yellow with buff trimmings; the roof is covered with shingles. The plans present an arrangement of spacious rooms, provided with all the modern conveniences; the principal rooms are separated by sliding doors; the hall is a very pleasant one, and has a "Dutch" door with a window at side glazed with stained glass; this hall is furnished in ash, and has a very pretty staircase with newels, posts, balusters and rail, all neatly turned out; the entrance is reached by a screen and arch that are filled in with turned spindle-work; there is a hat and coat closet underneath. The trim throughout is of hardwood, the door and window frames being beaded and turned sunk angle blocks at corners, with base blocks to stop base board against. The parlor to the left is a very pretty one, and is finished in white and gold, and contains a very open fireplace, with tile hearth and a handsome brick-brace mantel of hardwood, all to correspond respectively with the trim of this room; the library and dining-room are furnished with the same trim, being finished in mahogany in oak, with fireplace and mantel to correspond; there is a hall with stairs that lead to cellar and second floor, that have newels, balusters and rails that are neatly turned out of white pine, finished in the natural. The kitchen and all the trimmings are complete, being wainscoted with narrow beaded white pine, and finished with a neat molded cap; this kitchen has a open fireplace,

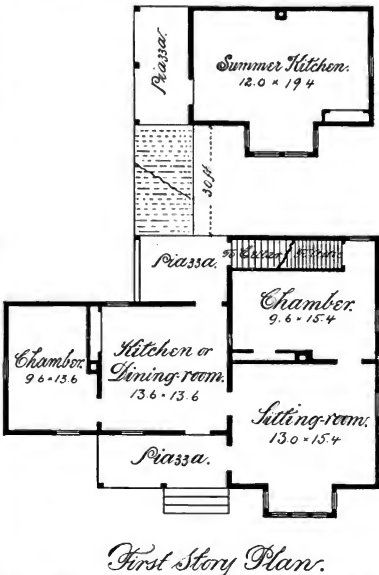
furnished with a range, a sink that is cased up with a closet under, and supplied with hot and cold water; there are two pantries and a dresser, all of which are provided with drawers, shelves and cupboards in the best possible manner; the butler's pantry has similar dresser, also a butler's bowl that is cased up and supplied in the usual way. The laundry at the rear is provided with chimney and wash trays that are supplied with hot and cold water in the usual manner. There are four bedrooms on the second floor that are well lighted and cheerful ones, all being provided with ample closet room, fitted up with shelves and drawers complete. The trim of these rooms is of white pine, finished in the natural; the bathroom is wainscoted and is provided with the usual fittings, bathtub, washbowl and water closet, all supplied. There are three bedrooms, a billiard room and bathroom finished in attic, in the best possible manner; the house is piped for gas, and the ceilings are neatly corniced, with cornices provided. The billiard room (above spoken of), which is built on the attic floor, is a good place of banish-

ment. Dimensions, front, 50 ft. 6 in.; side, 42 ft., exclusive of porch. Height of ceilings, cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. Underpinning and balustrade to front porch are built of field stone, laid at random; the superstructure above is of wood, covered with shingles, natural finish, and all trimmings are painted bottle green. The piazza above a covered porch, is finished in mahogany, expensive, contains an ornamental staircase of oak, finished natural. Parlor trimmed with white-wood, is finished in ivory white with a little gilt. The rest of the trim throughout is of white-wood, finished natural with hard oak and rubbed down. Fireplaces are fitted up in the usual manner, and have mantels of excellent design. Kitchen and pantries are wainscoted and fitted up complete. Second floor contains three bedrooms and bathroom, also studio. Bathroom is wainscoted and provided with the usual furnishings. Attic contains servants bedroom, besides ample storage. Covered collar around laundry and furnace. Cost \$5,100 complete, including furnace, range, mantels, etc.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

## CLIMBING DOOR FASTENINGS.

Dr. James Jackson Putnam, of Boston, who has had much experience with the ailments and misfortunes of children, writes to the Boston *Traveller* to call the attention of architects and builders to the danger of protruding cupboards and closet doors with handles which can only be opened from the outside. A week or two ago, four little children, in a town near Boston, shut themselves into a cupboard, which had a latch opening only from the outside, and three of them died of suffocation before they were discovered and released. Dr. Putnam thinks that, in all but the fatal result, many families have been saved or relieved, and says that, not long ago, he was told of a case where a nurse, left in charge of a two-year-old child, went into a closet which, like the "closet in many children's houses, had a knob only on the outside. The child, as babies often do, seeing the door open, shut it locking the nurse in. There was an open fire in the room, and unsuspected stairways in the house just outside, and the faithful nurse, anxious for her charge, succeeded, by talking to it, and amusing it through the locked door, in keeping it near her for two hours, when some one came to her relief. Dr. Putnam mentions a device familiar to architects, in which a brass button, slightly projecting and kept out by a spring, holds the door by springing into a circular depression in the striking plate, and says, what is true, that such a fastening, which can be opened by a push from the inside, is far better for a closet or cupboard than a slip-latch, which holds the door secure against force from the inside. Architects will, however, we think, say that these catches, while excellent for the doors of book-cases or cupboards, are not so well adapted for the doors of closets, etc., on account of the shrinkage of such doors, which, in winter, draws the two parts of the fastening so far apart that the door will not catch, although the *Eschschol*, to which Dr. Putnam refers, can be adjusted to make a moderate amount of the screw-driver, which at the same time weakens the action by releasing the tension on the spiral spring. There is, however, no difficulty in providing for the safety of children in other ways. Closet doors, for example, should always have knobs on the inside, and possibly have them in houses built under the direction of architects. To leave them off is a piece of parsimony characteristic of the meanest class of speculating builders, and it would not be amiss to make it a criminal offence, by means of a clause added to the building law. Cupboards are much less used now than they once were, and it is the doors of closets, more than any other, that are the cause of the deaths of children. They can be fastened from the outside.—*American Architect*.



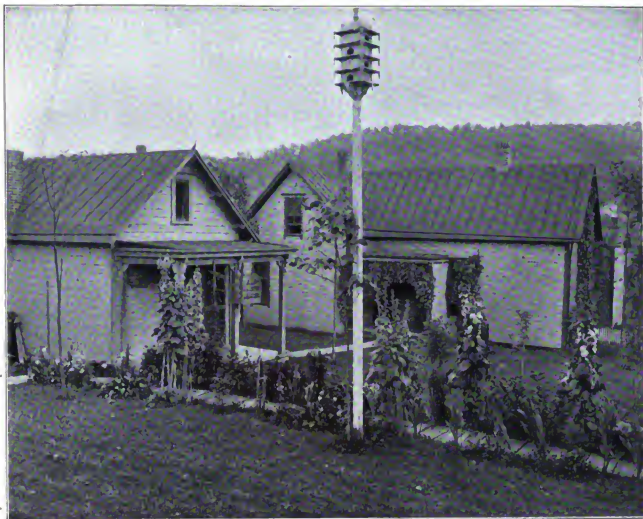
PLAN OF SMALL COTTAGE WITH SEPARATE SUMMER KITCHEN.—See Page 55.

ment for the gentlemen who smoke the odor of the weed is thus confined to the top of the house or escapes to the open air through the windows; when wife and daughters assure us that they "like the fragrance of a good cigar" it will well recollect them with this mental reservation: they do not like the odor to "hang around" for days in the curtains, carpets and upholstery; a well-ventilated room like this is desirable for other purposes; it makes a fine study for student or minister; a good wash for an artist, or a playroom for children. There is a cemented cellar under whole of house, with foundation wall of stone and underpinning of bluestone laid in black mortar; this cellar contains coal and wood bins, vegetable and furnace rooms, all fitted up in the usual way; the latter is provided with a heater fitted up in the best possible manner.

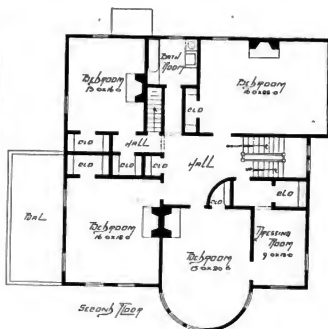
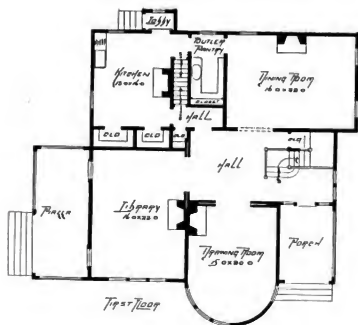
Our engraving was made direct from a photograph, taken specially for the SCIENTIFIC AMERICAN.

## A COTTAGE AT FAIRWOOD, NEW JERSEY.

We illustrate hereon, page 78, a cottage erected for Mr. Bayard, at Fairwood, New Jersey, and from plans prepared by Mr. Augustus Frenz, architect, same place.

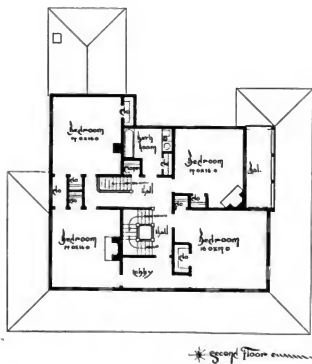
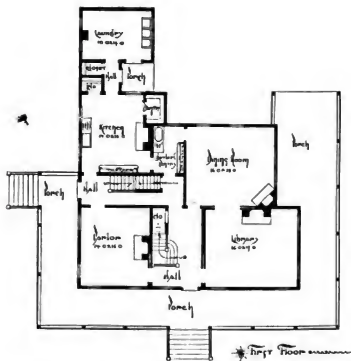


A SMALL COTTAGE AND SEPARATE SUMMER KITCHEN.—See Plan on Page 54.



THE PARSONAGE AT MONT CLAIR, N. J.—See Page 54.





A RESIDENCE AT SOUTH ORANGE, N. J.—See Page 54.



A COTTAGE AT FANWOOD, N. J.—See Page 54.

## A Night-or-Way May Be Built Over.

Away back in 1832 John Cowman sold lots in the block between Sixteenth and Seventeenth Streets, Union Square and Fifth Avenue, and across the rear of lots 1 and 2 reserved 15 feet as an alleyway, "subject to a right of passage for horses, carriages, and carts for the private convenience of the owners of lots 2, 3, 4, . . . and at the entrance of each of said ways into the street a proper and suitable gate with lock and key is to be kept," etc. When the purchaser bought one of these lots in 1880, he went ahead and extended the building on the front of the lot over and across this right of way, supporting the rear part on iron columns a foot in diameter, leaving an open space under the extension through its whole width 15 feet high and 15 feet 9 inches wide. The present owner of one of the adjoining lots tried to get an injunction against him to prevent this, but the Court of Common Pleas found that the building as erected does not prevent or obstruct the plaintiff's use of the way underneath it or beyond it. This view has been sustained by the Court of Appeals. The judge holds that while the design was that the passage is to be "kept open," that does not mean open to the sky, or to reserve light and air for the benefit of the several lots, but only for the passage of horses, carriages, and carts.

THE HARTMAN BLINDING BLIND CO., who have carried on operations for years in Worcester, O., finding their facilities inadequate to their increasing business, have selected Crestline, O., as the location of their new plant, and are now erecting a modernized and improved mill and other buildings. The main building is 118 feet high by 114 feet wide, in the shape of an L-twenty stories high. There are also a large brick engine room, the latest improved dry kilns and out-buildings of various sizes. They intend to equip the mill with all the latest and most improved woodworking machinery that can be secured, 70 horse power boiler and engine, with 114 feet of line shafting. Mr. J. B. Hartman, the patentee of the Hartman patent sliding window blind, is the senior member of the firm.

## STANLEY PLUMBS AND LEVELS.

The two new styles of plumbs and levels shown here-with, known as Nos. 30 and 36 in the catalogue of the Stanley Rule and Level Co., New Britain, Conn., have some special advantages worth calling attention to. The shallow grooves along the two sides of the No. 30 levels give the owner an excellent grip on the tool. In climbing ladders, walking on stagings or on the frame of a building, the peculiar form of the level imparts a feeling of steadiness to the workman when carries it.

For ascertaining a plumb, it can be brought to a perpendicular position with remarkable ease and accuracy, as can be seen in engraving.

Masons will fully appreciate the special features of the No. 36 level, as their occupation is mostly out of doors. From frequent exposure to cold, and with the constant handling of brick or stone, the fingers become stiff and the skin hardened. This level, as will be seen, is adapted for plumb and bob line.

STANLEY  
FOR ARCHT.

No. 30.



No. 33.

STANLEY PLUMBS AND LEVELS.

## SAFETY CRANE.

The chief source of evil in the "jib chain," or the chain which passes from the head of the jib to the top of the derrick mast, is not so often from breakage as from the chain being unavoidably short, and therefore apt to run off from the drum.

Messrs. Thompson & Lea have a very simple and efficacious arrangement introduced into the ordinary metal head of the jib, whereby, the instant that the jib chain breaks or ceases to hold, the heaving chain is up the jib and maintains it as well as the load at the end of it. The pulley over which the heaving



SAFETY ARRANGEMENT FOR JIB CHAINS.

runs has ratchet teeth attached to each side, and in the stirrup to which the jib chain is usually fastened there is a hooking-on rod provided with a spring at one end and a lever at the other attached to the two pawls which work into the ratchet teeth. When the jib chain is holding on, the spring is drawn home and the pawls are kept out of contact with the ratchet teeth. But if the jib chain breaks or becomes loose, the spring, being released from compression, pushes forward the lever, and the pawls engage with the ratchet. Thus the pulley is immediately gripped and the links of the heaving chain are imprisoned in the pockets of the pulley, the jib being thereby as firmly grasped in its angle of position as it was by the jib chain itself. In some tests of the appliance which were made on the Albert Hall estate by the contractor for the new buildings of the Royal College of Music, a three-ton derrick crane, fitted with the safety appliance here described, was employed. The jib was 25 ft. long, of 10½ in. timber, and weighed 15 cwt. A large block of stone was slung on the end of the heaving rope, and the jib chain, hauled taut, was secured at the drum end by a hemp rope. The chain on the drum was then unwound, so that the rope held the jib. This rope was then cut with a hatchet, and the metal head of the jib did not fall 8 in. before the spring lever and pawls had acted, and the jib was firmly held by the heaving chain on the pulley. This experiment was repeated many times with the like results. A model derrick, showing a modification of the invention to cranes in which wire ropes are employed, was also experimented with, and gave equally successful results.—The Builder.

## AN IMPROVED RANGE AND HEATER.

The combined hot water heater and range shown in the illustration has been tested during two severe winters in different States, and is now on the market, with the most flattering recommendations. The heating apparatus proper consists of a brick-lined range constructed in a special manner which makes it a powerful and efficient hot water heater, while yet possessing all of the cooking, baking, and roasting qualities of a range or cook stove. From the heater in the back of the range rise the flow pipes conveying the hot water to the radiators placed in the several rooms. The advantages of the apparatus are many and manifest. There is but one fire needed, which will not only heat an entire house of moderate dimensions, but will supply hot water to bath and laundry and do the cooking and baking for the entire household. This fire is in the kitchen, the most convenient place. Not only is the expense of the erection of a cellar heater avoided, but there is also annually saved a large proportion of fuel otherwise used for house heating purposes. The apparatus is economical, durable, efficient, and attractive, and brings within the reach of men of moderate means an opportunity to enjoy the best and healthiest

methods of house heating. The manufacturers of the "Heateencook" are Broomfield, Schmidt & Co., York, Pa., who will furnish catalogues giving full descriptions and prices.

## Railway Window Shades.

A correspondent asks us to name a subject on which to exercise his inventive genius. Here is one: It is a curious fact nobody has yet invented an anti-stickfast car window shade. The traveler experiences much the same trouble nowadays in raising a car window that he did fifty years ago. Now and then a shade may be found that is dry enough or so loosely fitted it may be readily raised. But for the most part, especially in damp weather, the shades stick fast or require much strength to move them. On some cars they resort to special levers to pry up and start the shades. It seems as if some of our ingenious inventors might easily study out and furnish an anti-rattling, anti-sticking shade, in every way adapted to the wants of the public and wear and tear of railway requirements. But the problem probably is not so easy and simple as it might at first appear, otherwise it would have been solved long ago.

## A Great Tunnel.

The proposed Simpson Tunnel will be, when finished, says the *Journal des Mines*, the longest tunnel in the world. According to the plans adopted, it will have a length of 20 kilometers (12 43 miles). The northern half of the tunnel will have an inclination of 1½ per 1,000; the southern, an inclination of 4½ per 1,000. The method of excavation will be the same as that on the Arberg Tunnel. The workshops, which will be established upon the right bank of the Rhone, will cost 4,000,000 francs. The motor force used will amount to 1,500 horse power, of which 320 will be used in drilling, 280 in ventilating, and 380 for electric lighting. This power will be obtained from the Mars River. The tunnel is estimated to cost, when completed, 40,000,000 francs, or \$1,340,000 per mile. The present wagon road over the Simplon, which rises to a height of 2,000 meters, was constructed by Napoleon at the commencement of this century, and cost 18,000,000 francs. From eight to nine hours are required to pass it. The tunnel when completed can be passed in three-quarters of an hour.

The F. T. Barnum, Detroit, Mich., Art Wire and Iron Works, have secured the contract for all the iron guards for the new Fort Brady, at Sault Ste. Marie. They also have had contracts for all the brass fixtures for the City National Bank, Cairo, Ill., all the iron and brass work for the State Normal Business College, Lincoln, Neb., the iron stairs for the new court house, Greenville, Miss., sidewalk lights for the new Beer building, Fort Huron, Mich., etc.



THE "HEATEENCOOK" RANGE, sold by Google

## INSIDE SLIDING BLINDS.

The inside sliding window blinds shown in the illustration consist of four sections of blinds to the win-



THE "WILLER" SLIDING BLINDS, CLASS A.

dow, arranged in such a manner that two sections go into a bottom and two into a top pocket. The guides have two grooves each, and extend into both pockets, so that the entire window can be uncovered by sliding the different sections into their respective pockets. These blinds, embodying all the latest im-

provements, and exhibiting the highest quality of workmanship, are made by the Willer Manufacturing Company, of Milwaukee, Wis., and our illustration is taken from their beautifully illustrated catalogue, No. 8.

## About Floors.

Why one finds so few good floors when architects never fail to make the proper specifications to obtain such is somewhat of a mystery to every one who suffers from bad floors, and this every one includes the man or woman who sweeps the floors, those who suffer from the dirt and dust they harbor, and especially those who carry off slivers in the soles of their shoes. Negligence is the principal reason for this state of facts, and both architect and carpenter are upon to the charge. As perhaps three-fourths of all floors laid are of yellow pine, a material that gives better satisfaction than even the higher priced hard woods, and as every architect and every carpenter knows how to obtain an almost perfect floor with this material, where does the negligence manifest itself? In the selection or acceptance of the material. Every board should have a straight, or "comb" grain, and if the log is properly sawed, every board will have such a grain, just as quarter sawing produces a grain of peculiar kind and beauty, but very few mills care to take the trouble to saw in this manner, and they will not as long as they can sell any kind of stuff for high grade flooring.

Floors to be carpeted are usually made of white pine, and to save a little labor they are usually nailed through instead of being nailed through the tongue. Some of the nails are almost certain to work up, and a hole in the carpet is the result. Such things may seem to be small matters, but a multitude of them creep into a building, and its occupant can never know the comforts of a well built house.—*The Northwestern Builder and Decorator.*

## A FINE STEEL CEILING.

The accompanying illustration represents a stamped steel ceiling recently placed in the passenger depot of the N. Y., N. H. & H. RR., at New Haven, Conn.

The ceiling is divided by heavy girders into many sections or panels, each of which has a cornice, an embossed border, and stamped plates of English Gothic design filling the center. The entire side walls are also covered with other patterns of the same material, as are also the halls and general offices of the company in the floor above.

The ceilings are manufactured in a large variety of designs by H. S. Northrop, at No. 30 Rose Street, New York, who will furnish catalogues, etc., on application.

## AN IMPROVED DOOR HANGER.

In the door hanger shown in the accompanying illustration, each wheel is on an independent axle, so that the door will run as easy and true in the center when there is some variation in the height of the tracks as when they are perfectly level. The wheels run on polished steel axles, turning in anti-friction metal, so that their operation is easy and quite noiseless. This hanger is designed to readily carry as much



THE BARRY FABLOR DOOR HANGER.

as 500 pounds. It is manufactured by the Central City Bolt Company, of Syracuse, N. Y.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-five years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



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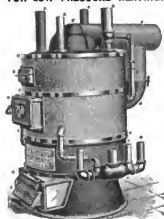
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### Notes and Queries.

(1) J. L. H. says: We have a 1½ inch pipe laid from our factory to a river, which is 40 feet away and is about 20 feet lower than the factory. The pipe enters a bank as it nears the river and runs into a large well 12 feet below the surface of the ground. The well is 20 feet deep and the pipe enters from where it enters the well and goes to the bottom, then turns up again in a T form to a height of 4 feet. Here we have a Valvular action jet pump which draws the water from the river for about three or four months after it is first laid, but since then has given no satisfactory results. I would like to know if you think a jet pump would work any better than the jet. We use the city water for coming out the pipe when it is dry. There are no valves in the pipe except where it turns down in the well; all other turns were made by bending the pipe. Do you know of any way that we can convey power to the river, work as compressed air or water or any way, by which we can force the water up to factory without too much wasting? A. The obstruction in the pipe that prevents the jet pump from working satisfactorily would also interfere with the action of a jet pump. If the pipe is of too small size, not galvanized, it is liable to rust and form scales on the inner surface throughout its length, which decrease the area and increase the friction. By raising the pipe at the river end and connecting with the water works pipe at the factory end, giving the full pressure on the pipe above by the stream at the river and where the pipe is permanently obstructed. If found to be obstructed, the pipe should be taken up and cleaned by

pushing a smaller pipe through with a sharpened coupling on the end, a little smaller than the bore of the 1½ inch pipe. If there should be a full, strong flow from the pipe, the next possibility will be air leaks. To remedy the fact, arrange the stream jet so as to discharge from an open pipe and start the jet. If there is air in the pipe or air leaks, the discharge will spatter, or become intermittent, possibly stop altogether. This is suggesting that the stream is made with the pipe fully charged with water. There is also a possibility that the separation of the air from the water by the partial vacuum in the water suction pipe has been caused by accumulating at the apex and separating the water in the pipe. By your statement, your stream has a probable lift of 20 feet or nearly the limit, and it may be that this is the source of your trouble. You can transmit power to drive a pump by a live rope system from a pulley in the factory to a pulley at the river with a couple of supporting pulleys at proper distances to keep the wire rope from vibrating.

(2) J. L. writes: I have a large looking glass and the quicksilver is moved. Can you advise what will remedy the trouble? A. No effort way of re-aligning a looking glass so damaged is known. Fragments of the amalgam can be loosened from pores of looking glass by a drop of mercury, and the amalgam can be slid off and dropped upon the worst spots, but your chance of effecting a good repair are doubtful. If the mirror is a silver-plated one, the silver treatment is useless. You may then succeed in replacing by means of the well known silvering process.

(Continued on page vi.)

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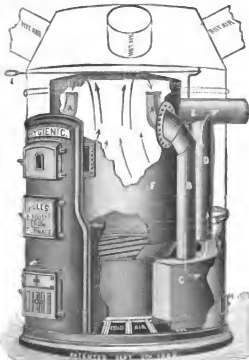
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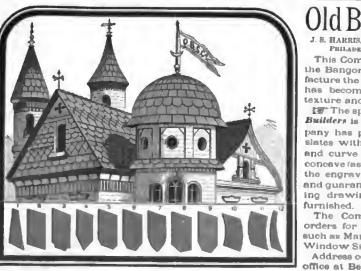
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And Back-water Trap, For Wash-Bowls, Sinks, Hubs and Wash Tubs, West Cleveland, Ohio.



(Continued from page iv.)

(3) R. A. H. asks: Will a bell that is struck on the inside give out any more sound than if struck on the outside? The bell not to swing to either side. A. The manner of arranging the hammer stroke on large bells is a matter of safety and convenience. The outside stroke gives the strongest tone and the bell is in light to crack. It will send the strongest hammer stroke on the outside. The inside stroke should be avoided, save in swinging bells, where it is necessary.

(4) K. M. I. says: Suppose a reservoir stands 300 feet or more above the point of discharge. A line of pipe and all points in the pipe line to be below the level of reservoir, is it known in engineering practice that not a drop of water might be discharged at the outlet, owing to the pressure of air in the pipe? An individual supposed by many to be somewhat scholarly has told me that he himself was not aware of such a phenomenon. He also told me that he could philosophically account for it, but that it would take too long a time to explain it to me. A. The condition of resistance of air as stated is well known to engineering practice. If there are inverted siphons in the line of pipe, with openings to air, amounting to as great or greater height than the total height of the head, there will be no flow of water through the pipe. The theory and fact is that the water separates from the air in the siphon, occupying the entire leg, while the air remains in the downspout leg. When the water has reached the last siphon, which represents a greater height than the whole siphon, it will pass. Draw the air from the bottom of the siphon relieve the back pressure.

(5) W. R. R. writes: I. It is said that if balls of wax and lead are dropped from the top of a building, they will fall together. Do you think this is wrong? A. There would be a difference, but it would be almost imperceptible. In a vacuum, both bodies would fall in the same time. B. How do accidents explain that exhalation of air, in a vacuum, both bodies being done without an apparent loss of energy? A. In being in a moist tube, water drops the force of cohesion, exerted over space, which represents the expenditure of energy. To extract the water from the tube, an exact equivalent of work would have to be done. Potential energy is represented by the separation of the water in mass from the water waiting the walls of the tube, or by the separation of the water in mass from the dry walls of the tube. If we assume a dry tube to be used, and adhesion to be one of the separating force.

(6) W. G. R. asks: For bathing purposes a person will water himself or himself? A. Artificial well water is healthy for bathing as much as for household purposes. The wells that furnish hard water do not affect the water in the tank as the soft water does. A little ammonia in the hard water makes a satisfactory and healthy bath. The mineral constituents of the hard water from artesian wells are perfectly fine and innocuous, with their various beneficial nature. Some wells furnish water of decided medicinal properties.

(7) F. R. R. asks: Is it safe to fasten a lightning rod to a wooden house with nails, without insulating the rod? A. Yes.

(8) C. H. M. asks: 1. How much cold will the few extinguishing liquid send, a species of which you have given me? A. It is supposed to send the coldest temperature of this kind. It is possible that the extreme cold of liquid might affect it. It is not good to use in the same ground? A. It is used in them. It is there any objection to running a lightning rod through a barn, following a post, instead of carrying it down on the outside? B. It is considered better practice to carry it outside of the building.

(Continued on page vii.)

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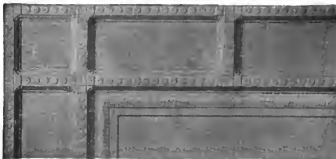
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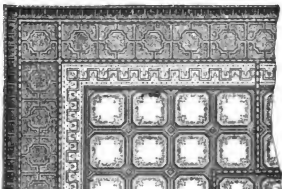
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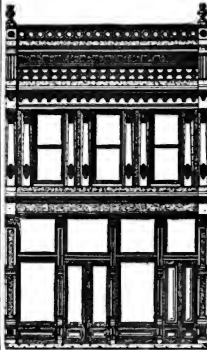
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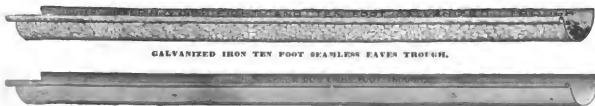
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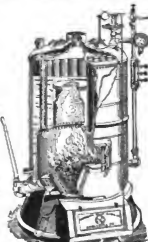
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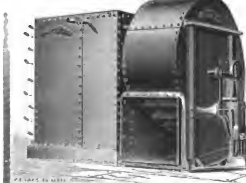
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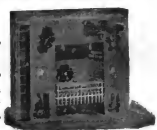
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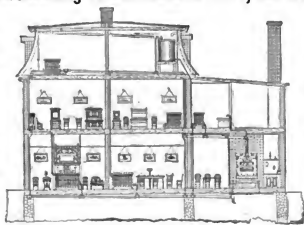


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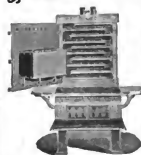
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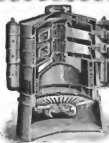
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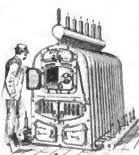


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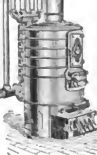
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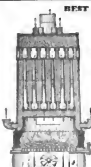
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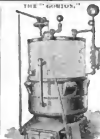
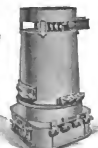


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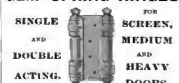
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No. 8.



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"WHEN THE WORLD WAS YOUNG."—BY EDWARD J. POTYNER, R.A.



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NEW YORK, NOVEMBER, 1892.

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## CONTENTS.

Of the November number of the American and Builders Edition of Scientific American.

(Illustrated articles are marked with an asterisk.)

\*Architect of Large Italian House, 60  
\*New Residence, a Colonial Style, 61  
\*Sewerage and Drainage, 62  
\*Decorative and Ornamental, 63  
\*Decorative and Ornamental, 64  
\*Decorative and Ornamental, 65  
\*Decorative and Ornamental, 66  
\*Decorative and Ornamental, 67  
\*Decorative and Ornamental, 68  
\*Decorative and Ornamental, 69  
\*Decorative and Ornamental, 70  
\*Decorative and Ornamental, 71  
\*Decorative and Ornamental, 72  
\*Decorative and Ornamental, 73  
\*Decorative and Ornamental, 74  
\*Decorative and Ornamental, 75  
\*Decorative and Ornamental, 76  
\*Decorative and Ornamental, 77  
\*Decorative and Ornamental, 78  
\*Decorative and Ornamental, 79  
\*Decorative and Ornamental, 80  
\*Decorative and Ornamental, 81  
\*Decorative and Ornamental, 82  
\*Decorative and Ornamental, 83  
\*Decorative and Ornamental, 84  
\*Decorative and Ornamental, 85  
\*Decorative and Ornamental, 86  
\*Decorative and Ornamental, 87  
\*Decorative and Ornamental, 88  
\*Decorative and Ornamental, 89  
\*Decorative and Ornamental, 90  
\*Decorative and Ornamental, 91  
\*Decorative and Ornamental, 92  
\*Decorative and Ornamental, 93  
\*Decorative and Ornamental, 94  
\*Decorative and Ornamental, 95  
\*Decorative and Ornamental, 96  
\*Decorative and Ornamental, 97  
\*Decorative and Ornamental, 98  
\*Decorative and Ornamental, 99  
\*Decorative and Ornamental, 100

## CITY RESIDENCE, NEW YORK.

We present as the subject of one of our plans in color in this issue a very handsome block of residences, erected for Messrs. Lamm & Rich, architects, on Seventy-second Street, near Riverside Park, New York City, N. Y., and from plans prepared by the proprietors. The building is of the Renaissance style of architecture. It is built of "quarry-faced" Indiana limestone with red sandstone trimmings. Stone cornices. Roof covered with Spanish tiles. We give plans and description of the end house, shown at the right of the engraving. General cellar contains furnace and coal cellar. Basement, trimmed with huest, contains breakfast room and kitchen. The basement also contains butler's pantry, larger, closets, and refrigerator. Breakfast room is provided with an open fireplace, and kitchen is furnished with range, sink, wash trays, etc. Vestibule has a tiled floor. The hall, throughout are trimmed with antique oak. They have paneled wainscoting, and the ceiling in front hall is heavily beamed. The staircase has carved newels. This hall has also a parquet floor. The door and window casings are in the Renaissance style. The parlor is in the Morgue style, and the walls are treated in cream, light blue and gold. The woodwork is of huest. The fireplace is furnished with tiled hearth and facings, and a hardwood mantel. Dining room is trimmed with mahogany. It has a paneled wainscoting and a ribbed ceiling forming deep pannels, the space between being filled in with carvings. There is also a china closet and fireplace receptacle. The butler's pantry is fitted up with bowl, closets, dumbwaiter, and stairs to basement refrigerator. Second floor is furnished with linen, contains two bedrooms, dressing rooms and bath. Dressing rooms have parquet floors. Bathroom is wainscoted with Italian marble and is furnished with exposed plumbing. The third floor contains two bedrooms, closets and bath, and the fourth floor on fourth floor is large enough for a billiard room. Our plate was made direct from a photograph of the building, taken specially for THE SCIENTIFIC AMERICAN.

## A RESIDENCE AT CLARFORD, NEW JERSEY.

One of our plates in color in this month illustrates a residence, Colonial in treatment, erected for F. C. Iron, Esq., at Clarford, New Jersey. An additional view of the house is also given on page 61. The design is excellent. The piazzas, towers and dormer windows are all pleasing features. The upholstery is in the modern style. The exterior is clapboarded, shingled and painted Colonial yellow with white trimmings. Roof, shingled and finished natural. Dimensions: Front, 35 ft. 6 in.; side, 35 ft., not including front piazza. Height of ceiling: Cellar, 7 ft.; first floor, 9 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior throughout is trimmed with white pine, finished natural, and highly polished. The various apartments communicating as they do make a most attractive vista of the entire floor. The hall, spacious, has a hardwood floor, and is provided with an ornamental staircase, turned out of quartered oak. This hall and staircase are lighted by stained glass windows, with pleasing effect. Parlor and library have open fireplaces, furnished with tiled hearths, and mantels of quartered sycamore and oak, respectively. Dining room is provided with buffet window glazed with stained glass. Butler's pantry is provided with bowl and dresser, inclosed with glass doors. Kitchen is wainscoted. It has a hardwood floor and is furnished complete. The second floor contains four bedrooms, three closets and bath. The bathroom is wainscoted and furnished complete. The front bedroom has an open fireplace and cherry mantel. There are two bedrooms on third floor, besides maple staircase. Cemented cellar contains furnace, laundry, etc. It is finished by the Terrell gas machine, and cost, \$5,927. Mr. Oscar S. Teale, architect, New York.

Our engravings were made direct from photographs of the building, taken specially for THE SCIENTIFIC AMERICAN.

## STONE ARCHES OF LARGE SPAN.

The two largest stone arches in the world are the one over the Adda at Treviso, and the other over the Dee, near Chester. Of these, the former is built of granite, and has a span of 251 ft. The latter is constructed of sandstone, with a clear opening between supports of 220 ft. Stone arches, if properly designed and erected, are in themselves—that is, so far as the absolute "raut" is concerned—practically indestructible. A comparatively small settlement in their foundations, or in almost any part of the structure, will, however, bring about premature decay and ultimate destruction. The immortality of their supports is essential to their self-preservation.

In a recent number of *Le Génie Civil* there is a design and description of a stone arch of 320 ft. span, which the designer, M. C. Tourny, ingenieur des Ponts et Chaussées, who, similarly to some other engineers, considers we have not yet reached the useful limit in the dimensions of arches of masonry. Curiously enough, there is no article, as will be pointed out, of the idea or analogy between the arch under notice and the

principle of the continuous or cantilever girder. It will be seen from the skeleton elevation in the annexed cut that the entire structure consists of three separate pieces—namely, the thin arch A and the two massive abutments B and C. The latter, although really independent, do to some extent form a portion of each other, since the curves of pressure, shown by the dotted lines, are continued down and contained within their thickness. All dimensions on the cut are in feet and decimals, from which, putting 8 for the span and V for the versed line of the segment,  $\theta = 0.135$ .

The form of the arch A is that known as "unloaded," of which the generatrix is always greater than the half circumference, and the particular curve of it is the catenary. The author insists strongly upon this curve, as the only one, been proved to be the one best adapted for air-loaded arches of large span. It is the curve of equal resistance, and as such permits of the line of pressure being drawn in such a manner as to pass nearly through the centre of the joints of the arch-stones, and exert upon each such a pressure as to tend to pull them together. From the fact that the intrados or soffit is parallel to the extrados the arch is also termed



"extradosed." An existing example of this somewhat peculiar form of arch is to be found in the roof surmounting the lantern at the Pantheon, in Paris.

In order to allow of the proper adjustment of the arch when the "centres are struck," as well as for the expansion due to variations of temperature, "articulations" or hinges are to be provided both at the springings and at the crown. In the braced iron arch, as well as in other types of iron bridges, this proviso is frequently insisted upon by some engineers. Theoretically, no doubt, the provision is an excellent one, but, as a matter of fact, the "hinges" of an iron arch bridge in France having a span of over 300 ft. have been removed, and the arch made continuous at the crown, without the stability of the structure being in the least impaired. It does not necessarily follow that the same course would be advisable with a catenary stone arch, but, whether or not, the effect is to induce a settlement in the span at the D in the figure, which assumes the form of an open joint, the hinge and articulation of which will depend upon the magnitude of the structure. It is evident that the curve of the abutments is not a prolongation of that of the surbaced arch. The object of this difference is to insure that at no point shall the line of pressure approach either the crown or the springings, which would be to risk the opening of any of the joints. In ordinary circular arches the point of rupture is usually located at an angle of about 80°, and if the curved abutments in the "cut" were traced with a radius approximately equal to that which would produce the curve of the arch, the point of rupture would be found at nearly the same spot. But by tracing the curve of the abutment, with a much larger radius, the line of pressure is maintained well within the proper limits of safety. In the figure, one of the abutments is curved to a radius of 191 ft., the other, one of 6 ft., the latter being purposely so drawn, in order to show the effect upon the dotted line of pressure, which is thus thrown more towards the extrados.

In the cantilever and continuous girder bridge the object at the springings is to bring the main line of pressure to the weight of the whole structure nearer to the supports, while at the same time diminishing those two items of construction at the centre of the span. Each bridge consists of three parts—confining our attention for the moment to a single span—namely, to the central pier, the two central piers, and the two central piers. In the cantilever bridge, the central girder be removed, the two others will remain unaffected by its absence. If, in a continuous bridge, the girder be severed at the points of inflection or of contrary flexure, and the central length removed, the equilibrium of the remaining lengths is undisturbed. This operation was carried out in the case of the Boyne viaduct, which is a continuous girder bridge of three spans, the middle having a length of 300 ft. The points of inflection are a few feet from the piers, and the junction of the central and side spans is a cantilever bridge. The two systems are nearly identical both in theory and practice, although there is a marked difference in actual construction.

Regarding the surbaced arch and curved abutments, when in a horizontal plane in a vertical plane, it is evident that the arch may be considered as analogous to the central girder of the cantilever bridge, and the curved abutments to the cantilever portions over the supports. The object in the case of the arch is to reduce the weight at the centre to a minimum, while augmenting them near the points d'appui. As the curved supports in the figure are to act strictly as abutments, they would stand alone, and consequently the central length—that is, the line of the arch—might be removed, the weight of the remaining part of the arch being supported by the stability of the remaining part of the building.

## A SUMMER COTTAGE AT ASBURY PARK, N. J.

We present, as a subject for one of our plates in this issue, a very attractive summer cottage, erected for Mr. C. H. Dinger, at Asbury Park, New Jersey (see page 64). The elevation has many pleasing features, and the plans show a convenient arrangement of rooms and a spacious piazza and lobby. The building is erected on brick piers with stone footings, with the exception of kitchen extension, which has a canted cellar under same. The exterior framework is sheathed and papered, the first story clapboarded and painted olive brown, while the second story is shingled and stained sienna; all trimmings are painted white. The roof is shingled and painted red. Dimensions: Front, 26 ft. 6 in.; side, 53 ft., not including piazza. Height of ceilings: First story, 9 ft.; second, 8 ft. The interior throughout is trimmed with yellow pine, finished natural. All inside partitions, furrings and ceilings are covered with narrow beaded yellow pine. Floors are laid with similar wood in narrow widths. Hall contains an ornamental staircase and fireplace built of brick, with a tiled hearth and mantel. Parlor and dining-room are spacious, well lighted, and each have octagonal projections. Kitchen is furnished complete. There are five bedrooms with large closets on second floor. Cost \$3,400.

Including furnace or furnishing for bathroom, \$1,500. Our plate was made direct from a photograph of the building, specially taken for the SCIENTIFIC AMERICAN.

## Aluminum Fronts.

A sixteen story building is no longer much of a novelty in Chicago, but one which is soon to be erected on the corner of State and Madison streets has some unusually novel features. In place of the usual brick or terra-cotta facing, aluminum plates are to be used on both fronts of the building. The building itself is of the usual fireproof construction, with iron columns, but the front between the windows are to consist of cast aluminum plates about 2-16th inch thick, which are to be held in place by strips of cast aluminum. The plates will be about 36x20 in., and the holding strips are to be about six inches wide, and fastened at angle irons attached to the window casings. The space back of the plate, between them and the columns, is to be filled with fireproofing, and a small space back of the holding strips with Portland cement. The composition of the plates and strips is to be 90 per cent. aluminum and 10 per cent. copper. Another feature of the building, which is almost as striking as the nature of this structure, is the size of the windows, some of which are 22 ft. across

## The Secret of Good Lime Mortar.

Dealing with the results of an extended investigation of the chemical characters of specimens of ancient mortar, Mr. John Hughes concludes that for practical purposes, the actual amount of lime present in a mortar may vary very considerably; but, within certain limits, the quality of the lime is of as great importance as its quantity—indeed, a smaller quantity of well-prepared good lime is much more effective in a mortar than a larger quantity of a badly prepared lime, or one that is naturally inferior. The proportions of sand in mortar may also vary considerably, even when the mixture is a really good mortar; and while it is always desirable that the sand should be rough, irregular in size, and with sharp edges, rather than be smooth and round, still, on the whole, the quality of the sand is not of so much importance as the quality of the lime. The presence of iron oxide and alumina in a form readily combined with silica is not to be objected to in good building lime—indeed, the purest limestones made by no means the best lime for building purposes. Finally, the higher the proportion of amorphous or gelatinous silica soluble in alkali, the better the quality of the mortar; and as this kind of silica is associated originally with the lime rather than with the sand, it becomes of great



A RESIDENCE AT CRANFORD, N. J.—See Page 62.

complete. Mr. C. M. Discoway, architect, No. 52 Broadway, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

## A COTTAGE AT DUBUQUE.

We illustrate, on page 65 of this issue, a pretty cottage at Dubuque, Iowa, built for F. W. Harris, from plans and specifications made by F. W. Langworthy, of that city. Dimensions: 26 ft. front; 28 ft. deep, not including porch; porch, 6 ft.; balcony, 6 x 18 ft. Cellar, 6 ft. 6 in. under all the house, with furnace room, coal bin, etc.; first story, 9 ft. 4 in.; second story, 8 ft. 6 in., and large attic with ample space for three rooms. Parlor, 12 x 15 ft., with grate and handsome wood mantel, and portiere openings to both hall and dining room. Dining room, 14 x 15 ft.; pantry, 6 x 9 ft.; kitchen, 11 ft. 6 in. x 12 ft., all finished in yellow pine. Hall finished in oak. The second floor contains three good sized bedrooms, two small dressing rooms and bathroom, finished in white pine and painted. Outside painted bottle green; roof painted red. It is, indeed, a model modern cottage home, of attractive exterior and convenient interior, that will meet the requirements of a small family. Cost, not

As it is generally known, buildings in Chicago are now limited to a height of 12 stories, but the limiting height in feet is not stated. This building will be built, however, under a permit granted prior to the passage of this ordinance, and so can be carried to the full height of 16 stories. It is evident that the appearance of this structure, 16 stories high and outwardly composed entirely of plate glass and aluminum, will be novel and striking.

## Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, farms, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MESS & CO., 361 Broadway, New York.

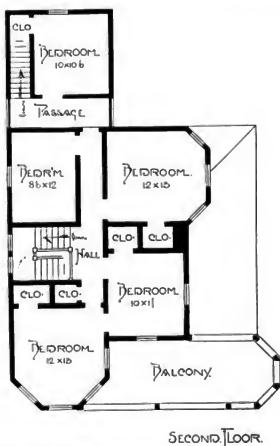
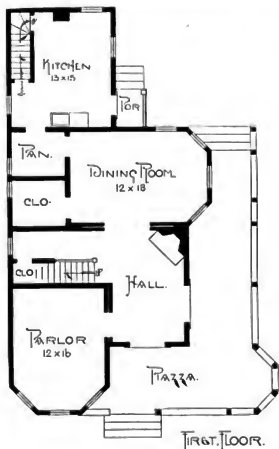
New York will exhibit at the World's Fair sections of all the trees which are indigenous to the State. Of these there are 43 species and 85 varieties, a number which is not excelled, it is claimed, in any State in the Union.

importance that the character and composition of the lime intended to be used should be fully inquired into, and the architect's or engineer's specifications drawn accordingly.

## DECORATIVE PAINTINGS.

The productions of these eminently interesting pictures, shown on page 61, are taken from photographs directly produced from the originals. The *Building News*, to which we are indebted for our cuts, says: "Of the grave and harmonious coloring exhibited in this masterly work, little need here be added to the world-wide approval which has been accorded to it. To the architect particularly, Mr. Poynter's interiors are always interesting. 'Pleasure,' by Mr. W. Reynolds-Stephens, presents maternal joy and childish delight in the pose of the craft, and love, resting in the stern, the whole composition being treated in delicate tints, redolent of summer and the holiday of life, as the calm waters of the peaceful lake reflect the brilliancy of the passing day."

Glass ceiling and wall decorations are becoming quite popular.

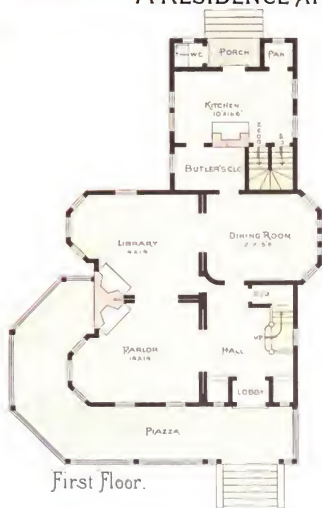


A SUMMER COTTAGE AT ASBURY PARK, N. J.—See Page 63.





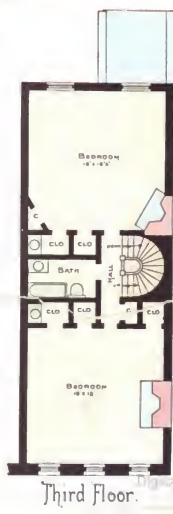
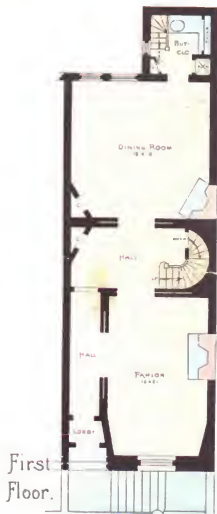
A RESIDENCE AT CRANFORD, N.J.



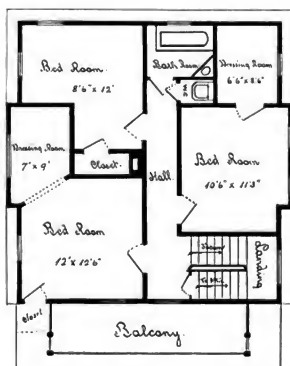
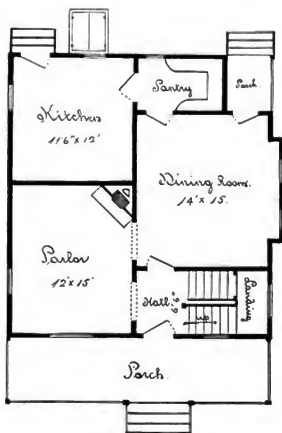




CITY RESIDENCES, NEW YORK.







First Floor Plan

Second Floor Plan

A COTTAGE AT DUBUQUE, IOWA.—See Page 63.

## A DOUBLE DWELLING AT SPRINGFIELD, MASS.

Our engraving, page 63, presents a model design for a double dwelling house, recently erected for Messrs. Muri and Russell, at Springfield, Mass. The principal features are the towers, porch, balcony, and chimneys, which are an architectural feature in themselves. The underpinning, front and section at side are built of rock-faced sandstone; the remainder of the building is sheathed, papered and then covered with shingles, stained sienna, lead, shingled and painted red. Dimensions: Front, 41 ft.; side, 34 ft., not including porches. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior throughout is trimmed with antique oak. The doors and windows have beaded casings and turned angle blocks. The halls and principal rooms on first floor are connected by double-sliding doors. The staircases are provided with oak rails, posts, balusters, etc. The porches are circular in form, and are well lighted. Libraries and dining rooms are provided with fireplaces built of brick and furnished with tiled hearths and fireings, and hardwood mantels of excellent design.

angle blocks and beaded casings. The hall contains a staircase of unique design, turned out of quartered oak. The feature of this staircase is the octagonal projection, thrown out at second landing, and lighted by stained glass windows. The fireplaces in parlor, library and dining room have tiled hearths and hardwood mantels of excellent style. The kitchen and its apartments are furnished in the best possible manner. There are three bedrooms, large closets, den and bathroom on second floor. Bathroom is wainscoted and fitted up replete. There are two bedrooms and storage on third floor. Cemented cellar contains laundry, furnace and other apartments. Cost \$5,350 complete. Mr. Charles G. Jones, architect, 280 Broadway, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

## A COLONIAL RESIDENCE.

We present here on page 67, engravings and floor plans of a residence, erected for William H. Mercein, Esq., at Oakwood, Staten Island, and from plans prepared

by the proprietor. The hall contains a staircase of unique design, turned out of quartered oak. The feature of this staircase is the octagonal projection, thrown out at second landing, and lighted by stained glass windows. The fireplaces in parlor, library and dining room have tiled hearths and hardwood mantels of excellent style. The kitchen and its apartments are furnished in the best possible manner. There are three bedrooms, large closets, den and bathroom on second floor. Bathroom is wainscoted and fitted up replete. There are two bedrooms and storage on third floor. Cemented cellar contains laundry, furnace and other apartments. Cost \$5,350 complete. Mr. Charles G. Jones, architect, 280 Broadway, New York.

Carpenter and mason .....	\$3,925 00
Plumbing .....	345 00
Heating and range .....	175 00
Electric bells .....	30 00
Wire screens and doors .....	50 00

Total .....

Our engravings were made direct from photographs of the buildings, taken specially for the SCIENTIFIC AMERICAN.

## Painting the World's Fair Exposition.

The *Journal of Decorative Art*, London, says: "Chicago, in 1892-3, will be the centre, where is to be centred any and every event yet known of in connection with the painting trade, from the builder's point of view. To attempt anything at the present moment like a detailed description of this amazing enterprise would be purely absurd, for this, the most majestic and Herculean task of



A COLONIAL RESIDENCE AT OAKWOOD, STATEN ISLAND.—See this Page.

The floors are laid with maple in narrow widths. Kitchens and pantries are wainscoted and trimmed with white pine, finished natural; these apartments are furnished with the usual fixtures replete. The second floor of each dwelling contains four bedrooms, den and bathroom, while the third floors contain two bedrooms and storeroom. The cemented cellar is divided same as the building above, and each apartment is fitted up with laundry, furnace, etc. Cost \$10,495 complete. Mr. B. Hannett Seabury, architect, Gills Building, Springfield, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

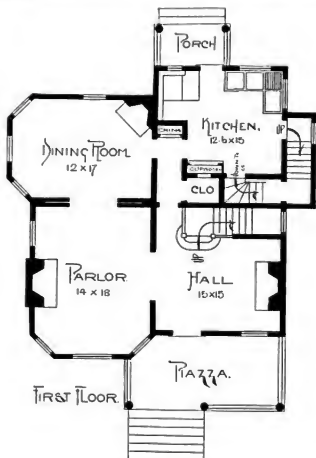
## A RESIDENCE AT CRANFORD, N. J.

The engraving, page 66, illustrates a "Queen Anne" cottage, erected for Theodore W. Sutton, Esq., at Cranford, New Jersey. Dimensions: Front, 31 ft.; side, 16 ft. 6 in., not including side porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. Underpinning, brick. The exterior is shingled and painted red, lead, shingled and painted white. The interior throughout is trimmed with white pine, finished natural. The doors and windows have turned

by the proprietor. The design is of the "Old Colonial" style, and the plans show many large, square rooms, a pleasant piazza and balcony. The underpinning is built of local brick, laid in red mortar. The building above is of wood, with the exterior framework sheathed, shingled, and stained with brown shingle stain. Trimnings are painted white. Blinds are painted bronze green. Roof, shingled and finished natural. Dimensions: Front, 37 ft.; side, 35 ft. 6 in., not including porches. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with white pine. The doors and windows have fluted casings and turned angle blocks. All the woodwork is painted cream white. The floors on first story are laid with ash, 1/2 in. x 2 1/2 in., filled dark with wax finish. Hall contains a staircase turned out of ash and finished natural, while the steps and risers are painted same as trim. The fireplace in hall is built of cream white brick, with hearth laid with same of a darker shade. This fireplace is furnished with a Colonial mantel with columns, etc. The parlor and dining room have similar fireplaces and are separated by double sliding doors. Kitchen is wainscoted and furnished in the best possible manner. There is a well lighted hall on second floor, besides four large bedrooms and bathroom, the latter wainscoted and furnished with a

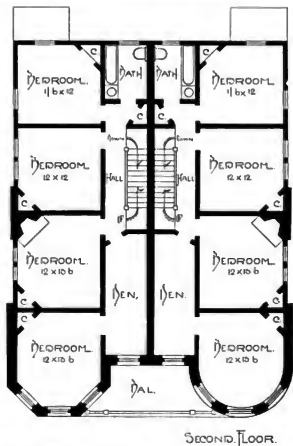
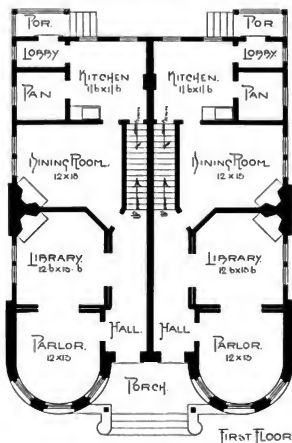
painting to be ever accomplished is now only in embryo, so to speak. When we consider that this massive structure, the erection of which is to cost \$10,000,000 and upwards, the master-painter may be able to entertain, at least, an approximate idea of what is to be done there in his way. As early as November last, a small portion of glazing and external painting was constructed for the amount of \$150,000, whilst another separate contract was secured for gliding the dome of the Administration building, which will be the most conspicuous architectural feature of the Exposition. The dome will be covered with aluminum bronze, a newly discovered amalgam, which is said to gladden brighter than gold. The contract has been let for \$55,000.

"No doubt but by autumn next the painter's work will have attained a stage of progress, assuming a form of industrial aspect, which our time need not expect to be again presented with. Certainly the United States Congress had been happily inspired when it selected Chicago as the site of the Universal Exposition of 1893, as all the States of which the New World is composed are but tributaries of Chicago, which has become the key of every line of communication, besides offering on the shores of Lake Michigan an incomparable site for the gigantic manifestation of 1894."

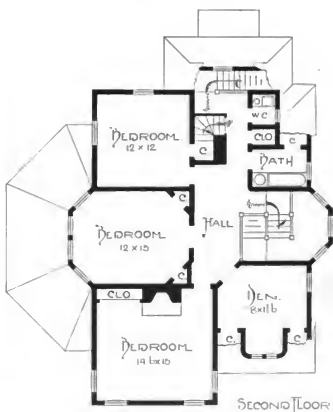
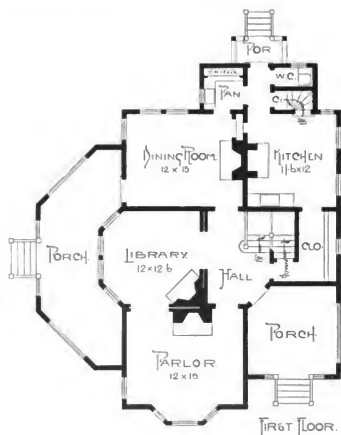


A COLONIAL RESIDENCE AT OAKWOOD, STATEN ISLAND.—See Page 66.



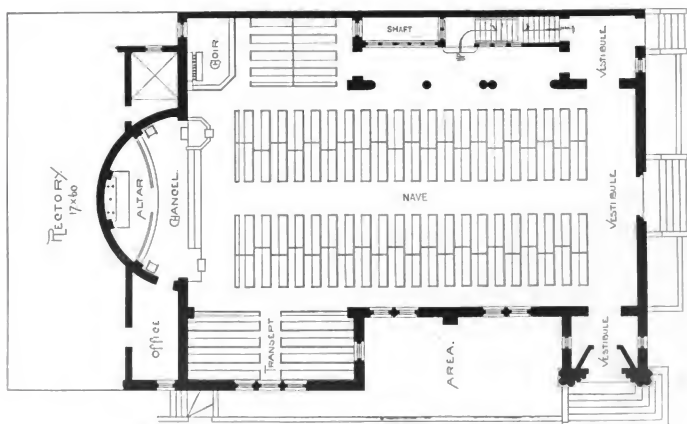


A DOUBLE DWELLING, SPRINGFIELD, MASS.—See Page 66.



A RESIDENCE AT CRANFORD, N. J.—See Page 66.





ST. JAMES' LUTHERAN CHURCH, NEW YORK CITY.—See Page 72.

## GIRLS' DORMITORY, BOBOE HALL, STANFORD UNIVERSITY.

The plans herewith show the general arrangement of the main and second floors of Boboe Hall, Girls' Dormitory, lately erected at the Stanford University, Cal., and will accommodate eighty pupils. This building is built of concrete and was erected and finished complete within sixty days from the order to prepare the plans. This is working with a rapidity unusual in buildings of such dimensions. For our illustrations and the above particulars we are indebted to *The California Architect and Building News*.

## ST. JAMES LUTHERAN CHURCH, NEW YORK CITY.

We present, on page 71, illustrations of St. James' Lutheran Church, on Madison Avenue and Seventy-third Street, New York City, N. Y., which was consecrated on October 18th, by the pastor, the Rev. J. B. Rosenmeyer. The church is a striking piece of architecture. It is Romanesque Gothic, cruciform, and of pure ecclesiastical style. It is built of pink Milford granite with Worcester brook sandstone trimmings—a very pleasing combination of colors. Roof covered with red English tiles. A palatial portico, with balcony and columns richly carved and sur-

mounted with a large chisel and a fireplace replete. Three bedrooms on third floor. Concentrated cellar contains furnace, laundry and other necessary apartments. Cost \$6,250 complete. Mr. J. William Roberts, architect, No. 252 Market Street, Newark, N. J.

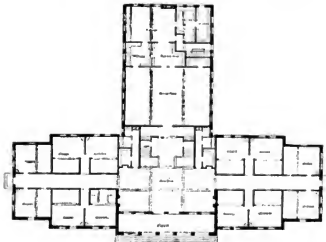
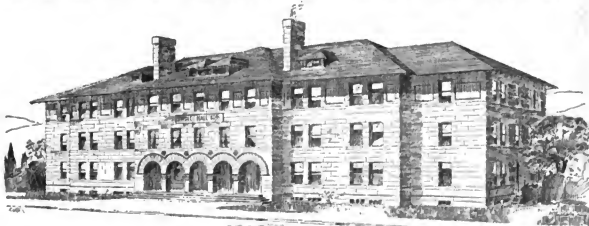
Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

## A Prehistoric Temple.

One of the most remarkable monuments in America is in San Luis Obispo County, Southern California. A great rock rises 150 feet above the plain of Cariso, and in the distance looks rugged and forbidding. On near approach it is seen to have on its eastern side an opening, twenty-five feet broad, into an inner temple or court, with level floor, 225 feet long and 125 feet broad at its widest part. The ceiling is 60 to 100 feet high. The great natural cathedral is a wonder to geologists, but it is more wonderful to archaeologists. It was evidently used by prehistoric men as a temple of worship or a capital of government. On the walls are paintings of red, white and black, doubtless having a meaning. There are figures representing fields, sun, forts, squares, men and animals. The colors are apparently as bright as when laid on. The wonder

## A RESIDENCE AT ASBURY PARK, NEW JERSEY.

Our engraving, page 70, shows a residence recently erected for Mrs. A. Wyckoff, on Grand Avenue, Asbury



GIRLS' DORMITORY, LELAND STANFORD, JUNIOR, UNIVERSITY, PALO ALTO, CAL.—Percy &amp; Hamilton, Architects



mounted by a stone cross, forms the unique and imposing Madison Avenue entrance. The outer entrance and windows have cluster capitals flanked on either side of opening. The building has a frontage of one hundred feet on Madison Avenue, and sixty feet on Seventy-third Street. The nave is sixty-eight feet deep and thirty-three feet wide, while the transepts are twenty-five feet wide and twelve feet deep. The interior, pews and woodwork are of polished oak. Stone pillars with embossed capitals divide the nave from the western aisle, and lofty Gothic arches span the chancel and transepts. The chancel decorations are by Tiffany. The side pews contain the Commandments and the Apostles' Creed. The central panel, or reredos, is wrought of opalescent gold mosaic, centering about a magnificent cross in relief, heavily incised with jewels. Beneath and supporting this is the altar of delicate Sierra marble, inlaid with glass mosaic, bearing on its front a medallion of religious emblems set in relief, and heavily jeweled with opals and other stones. The eagle lectern, altar rail and pulpit are of polished brass, ornamented with ruyper and bronze. The pulpit is octagonal in form. Four panels contain emblems of the Evangelists modeled in bronze, and the centre canopy of a Latin cross of copper brass trimmed with rays emanating from the junction of the arms. The

Park, New Jersey. The design is an excellent one, with an abundance of piazza room, while the plans show many large, square rooms, handsomely trimmed and fitted-up replete. Foundation, stone. Underpinning, brick. Exterior framework, sheathed, papered, cleareboarded and painted pearl gray, with trimmings painted white. Gables shingled and painted a tile red. Roof shingled and painted an Indian red. Dimensions: Front, 40 ft.; side, 40 ft., not including front piazza and rear lobby. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 11 ft.; third, 8 ft. The interior throughout is trimmed with white pine, the first story finished natural, and the second and third stories treated with colors in a delicate manner. Hall, 10 feet wide, is connected with parlor and library by double sliding doors. It contains a staircase of handsome design, with carved newels, and is well lighted by windows glazed with stained glass. Parlor, library and dining room have open fireplaces, furnished with tiled hearths and fireings, and hardwood mantels. Butler's pantry is properly fitted up with cupboards, drawers and butler's bowl. Kitchen, wainscoted, is provided with a boiler, sink, fireplace and lobby. Back stairs to second and third stories start from kitchen, and beneath these the stairs to cellar descend. There are four bedrooms, two and bathroom on second floor. Each bedroom is pro-

vided with a large closet and a fireplace replete. Three bedrooms on third floor. Concentrated cellar contains furnace, laundry and other necessary apartments. Cost \$6,250 complete. Mr. J. William Roberts, architect, No. 252 Market Street, Newark, N. J.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

## PATENTS.

Messrs. MOTT & Co., in connection with the publication of the SCIENTIFIC AMERICAN, continue to examine inventors' claims and to act as Solicitors of Patents for Inventions.

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**A STATUE OF COLUMBUS IN STAMPED COPPER.**

The illustration represents a statue of Columbus made in stamped copper, ranging from 30 to 32 ounces, the joints counter-sunk and riveted, and the whole finished in the highest style. It is the production of W. H. Mullins, manufacturer of architectural sheet metal work, Salem, Ohio. The statue will compare favor-

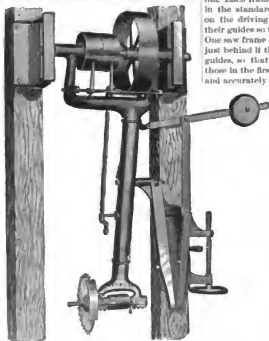


COLUMBUS.

ably with cast bronze work, and will bear the closest and minutest inspection. Three of these statues have been sold for park monuments. These statues are made of stamped copper, supported on a strong framework of steel and iron. The same manufacturer is producing a variety of similar work for a theater at Tlaxcala, Mexico.

**AN IMPROVED PARALLEL SWING SAW.**

The illustration represents a new swinging cut-off saw, which is so made that the saw advances in a straight horizontal line instead of in an arc of a circle, as usual. This new feature enables the use of a considerably smaller saw, also makes the machine available for other purposes, notably for dado work, such as grooving, planing, rabbeting, tenoning, smoothing,



PRYBIL'S IMPROVED SWING SAW.

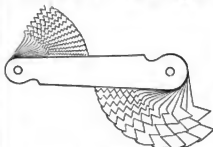
etc. For this purpose a suitable dado head—of which two sizes, 8½ and 10½ in. diameter are made—is furnished for the machine. One advantage of this machine for dado work is that the work is always in plain view, which is not the case where the head is under the stuff worked. In gaining and rabbeting, the work can be depended on to go together all right, as the thickness of the parts left standing is sure to be the same in all cases, irrespective of the thickness of the stock, which is not the case when cut from below, as with a saw table.

The head, as illustrated, consists of two flanges provided with scoring knives, which can be adjusted to compensate for wear, and with interchangeable routing cutters to correspond to width of groove to be cut. This head is, of course, also adapted to use on any other machine suitable for such work. The height of the saw arbor above the table is adjustable by means of a hand wheel to regulate the depth of cut, and to adjust to the size of saw or cutter head used. An 18 in. saw can be used, which will cut off a 6 in. plank 24 in. wide, also 34 in. saw to cut off an 8 in. plank 30 in. wide, without turning over. The guard is adjustable to the size of saw or cutter head used. The weight of the moving parts is so perfectly balanced that they will remain in any position in which they are left.

For further particulars, write to the manufacturer, P. Prybil, 507-519 West Forty-first Street, New York City.

**A NEW SCREW PITCH GAUGE.**

The illustration shows a gauge having 24 pitches, 4 to 30, as follows: 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30. The teeth are sharp and clean cut. It is a reliable gauge by



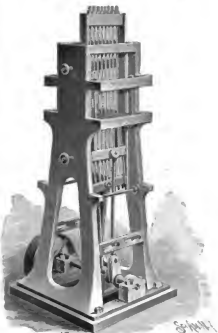
STARRETT'S NEW SCREW PITCH GAUGE.

which to grind and test a threading tool at sixty degrees, and is especially convenient for an inside tool. The cut represents the full size of the gauge. It is manufactured by L. S. Starrett, Athol, Mass., U. S. A.

**AN IMPROVED GANG SAWMILL.**

The gang sawmill shown in the illustration, although it may be adapted for sawing different kinds of material, is especially designed to saw shingles, operating two gangs of saws in such a way as to saw up an entire bolt at one operation, without waste of stuff, the saw gangs being independently adjustable in relation to each other to give the desired pitch or bevel to the shingles. The improvement is the invention of Mr. William T. MacKey, of Vancouver, British Columbia. Each frame, with its gang of saws, is reciprocated in the standard by a pitman, connected with a crank on the driving shaft, the frames being arranged in their guides so that the wear may be readily taken up. One saw frame slides vertically in the standard, and just behind it the other saw frame slides in inclined guides, so that its saws will be at a slight angle to those in the first frame, the guide frame being quickly and accurately adjusted by the set screws projecting

through the sides of the standard. In operation, one frame goes up while the other goes down, the vertical saws cutting the bolt into straight strips and the oblique saws then cutting these straight pieces to the desired pitch or bevel. At a convenient height for the insertion of the bolts to be sawed the standard has projecting portions, one above the other, which form supports for upper and lower feed bars, adapted to move back and forth at right angles to the saw frames. These feed bars have teeth in their faces to engage the bolt, and move toward each other to clamp it in place, reciprocating to feed the bolt through the machine, the lower feed bars being lifted upward and thrown forward, while the upper ones are thrown downward and forward. The inclined guides may be arranged vertically if desired, so that the bolt may be sawed into

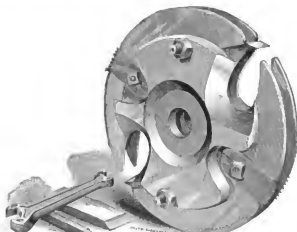


MACKY'S GANG SAWMILL.

saws of uniform thickness. It is said that this saw-mill, cutting shingles, will cut from three hundred to four hundred thousand per day of ten hours. The machine may be also conveniently adapted, by the addition of any of the ordinary feed motions now in use, to the cutting of lumber into bevel siding or boards.

This improved mill is being placed on the market by the Mackey Patent Gang Mill Co., of Vancouver, Toronto, and Buffalo.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Mun & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address: Mun & Co., SCIENTIFIC AMERICAN, New York.



DADO HEAD FOR USE INSTEAD OF SWING SAW.

## AN IMPROVED SPRING HINGE.

We illustrate herewith a new double-acting spring hinge, which has been put on the market by Messrs. E. C. Stearns & Co., of Syracuse, N. Y. It is of a plain and tasteful pattern, and the manufacturers claim that



STEARNS DOUBLE-ACTING SPRING HINGE.

it exceeds in strength any hinge heretofore introduced for the same purpose. The springs are made of a superior quality of steel wire, and held in place in the leaves in such manner as to insure against their becoming loose and preventing decrease in the tension. They are finished in Milan bronze and packed with and without false flaps, and with or without screws, in a slide-cover wooden box.

## APPROPRIATE AND BEAUTIFUL WALL PAPER DECORATIONS.

Decoration is the handmaid of architecture, and the many beautiful homes we have illustrated are incomplete in their interiors unless appropriately decorated. How many otherwise beautiful rooms have been artistically defaced by unbecoming ornament and inappropriate color in their interior finish! The Birge & Stone wall papers have accomplished much in interior decoration. What more appropriate finish for a room in one of the many beautiful "colonial" homes that we have illustrated than the pure "colonial" ornament shown in the accompanying sketch, classical, almost Grecian in simplicity, yet with a suggestion of easy grace of style? A simple paneled frame in plain lines enclosing and framing every wall space. This design colored in reds, blues, greens, or yellows on an ivory white

ground, or the reverse treatment, the strong primary colors used as the ground with the pattern in ivory white, and the entire woodwork of room painted in ivory white, will make a most artistic finish for a "colonial" interior.

The inside room, illustrated herewith, has a wide fringe suggestive of the purpose of the room, and a wall and ceiling ornament that corresponds.

All the Birge papers are made in sets, designed and colored complete for an entire room, so that even an inexperienced workman, if he will apply them as designed, cannot fail to produce a beautiful interior.

## SPECIAL IMPROVED BAND SAW GUIDE.

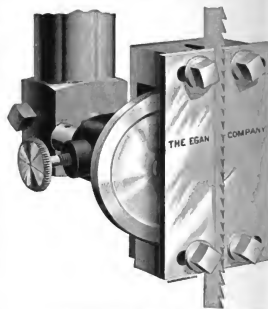
A late improvement designed to facilitate the working of band saws is shown in the accompanying illustration, whereby the blade in use can be depended on to last until absolutely worn out. The frame holding the side guides is adjustable to and fro for the various widths of blades by means of the thumb screw, as seen in the cut. The back of the saw blade has a very long bearing across the face of the roller, thus providing for the least amount of friction and spreading it over the largest surface possible. The side guides are of hardened steel, supporting the sides of the saw blade in the most approved manner, and they are adjustable sidewise with a wrench, being movable to the blade or from it, as desired to suit the various widths of saws. For further information address the makers, The Egan Company, 200-220 West Front Street, Cincinnati, Ohio, U. S. A.

## Aluminum Alloy Metal.

This metal, manufactured by the Aluminum Alloy Metal Co., Hampton, Iowa, has now been before the public seven years. Like all new discoveries,

it has had to pass the gauntlet of conservative criticism; consequently, during the first few years of its manufacture, its use was limited. During the past year, however, perhaps from the fact that the first trials have proved the metal to possess the good qualities claimed for it, this metal has commanded little, not

alone to the architectural and mechanical professions, but to the consumers generally. Architects say they have given this metal a careful test; that its expansion and contraction are merely nominal, not so much as its copper; that the buildings covered with it have stood the test of exposure to the weather of both northern and southern climates for upward of six years without paint or other means of protection, and under these conditions present no signs of rust or corrosion, and that its beauty and durability are unquestioned. Elevators, court houses, railway depots, colleges, monasteries,



SPECIAL IMPROVED BAND SAW GUIDE.

warehouses and private dwellings attest the excellence of this metal. Those whose attention has not been called to it, or, if it has, but vaguely, would do well to write the company for further particulars.

**CURIOUS FOUNDATIONS.**—The *Railway Review* tells of a novel method of laying foundations in swampy soil recently employed by an American engineer. The building to be supported was a low wooden one which it was proposed to use for the storage of machinery. Casks were set in holes in the ground along the line of posts and were filled to the depth of about one foot with iron turnings. The ports were placed in the casks, which were then filled with iron turnings compactly rammed in place. A solution of salt and water washdown poured over the turnings, under the action of which they solidified into a hard mass. The best of the oxidation of the iron was so great that the posts were charred. This also served to act as a preservative, and to that extent the iron turnings are probably superior to concrete under similar conditions.

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Factory, Seneca Falls, N. Y., U. S. A. Warehouses, 16 Murray St., New York.

## Notes and Queries.

- (1) A. B. asks: How many feet in length of 1 inch iron pipe would be required to act as an efficient steam condenser, placed in running water, for a one horse power engine? What should be the relative size of air pump to steam cylinder in such an engine? Very low pressure steam is intended to be used. A twenty-five foot one inch iron pipe is sufficient. A five-horse power pump should have two cubic volumes of steam cylinder.
- (2) Reno asks how to polish black walnut with oil, and what kind of oil to use. A. Mix with good whiting such colors as will produce an oar as possible the color of the wood to be finished. This mixture to be dry. Then give the wood a good coat of oil, and sprinkle the mixture over the wood until it is pretty well covered; then with a soft rag or other soft substance rub this on well. When the drying is satisfactory, finish with linseed oil, put on with a brush, wipe off, and rub in a polish with fine emery; finish with a silk handkerchief or any fine fabric.
- (3) J. M. asks: How many horse power will it require to furnish steam for a drying room 16 ft. x 16 ft. x 10 ft. long? How many coils of pipe, and the best way to arrange them, etc. for drying three players (4 ft. high). In most cases power and about 100 feet 1 inch pipe, which may be arranged in a flat coil just above the stove. For ventilation, have a small inlet for fresh air under the coils, so as to spread the air in all parts of the coil, and in

the same manner ventilate the top, so as to allow all parts an equal escape for the steam. Steam is best and safest if you have it. If you require steam only for the drying room, a hot air stove is preferable.

(4) F. K. asks whether water in range boilers heated by water but is suitable for cooking purposes. A. It is objectionable, although the hot water from the range boilers is a good deal used by cooks, for boiling vegetables and meats. If the boiler is fitted and much water used through it, there is no objection. Water that has remained but in the boiler a short time gives an unpleasant odor, and if in a pervious hot boiler, in potatoes.

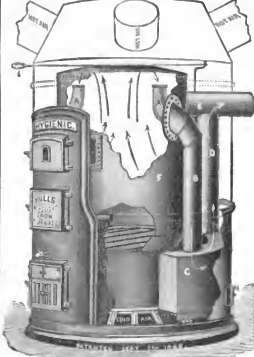
(5) A. H. G. asks how to color white-wash brown, a cheap color, that will not wash off easily. A. Add brown stains to the white wash in order to produce the desired color, and mix with oil or glass water.

(6) R. W. many of the bricks now and throughout the country are made without the intervention, or "frog," as it is called. Those which are without never have them, and many of the hand-made bricks are not provided with them. It is very doubtful, indeed, whether the frog is of any practical advantage. In fact, the generally accepted opinion now is that it is a detriment rather than otherwise, as it usually increases the quantity of mortar in a wall, and therefore weakens it. The object of the mortar is nothing beyond forming an adhesive substance between the bricks, and it is difficult to see how the frog

(Continued on page 17.)

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(Continued from page iv.)

(7) G. W. T. asks: Will you please be kind enough to give me your ideas about concrete foundations for houses? Which is the most durable material to give—concrete or piles? I wish to build a new lot which is not very solid ground, and do not know which to use for a foundation. A. If the soil of your lot is simply water, or mud, or soft, or with concrete composed of 1 part of good concrete cement to 4 parts of gravel, broken bricks, or pieces of hard brick, not larger than a hen's egg, and 3 parts of clean, sharp sand. Piles are generally employed where the necessity of the ground goes down a couple

(8) J. P. writes: I have a marble mantel in my house stained in imitation of porphyry. The staining is wearing off in spots, exposing the white marble; what kind of paint or stain can I use to make a perfect color? A. Marble may be stained or dyed of various colors by applying their solutions to the stone made sufficiently fine to make the liquid just sink into the surface. Success in the application requires considerable experience. For a brown color a tincture of logwood is used; for blue, a stercora of Humea is used; and for crimson, a solution of alkali red in oil of turpentine.

(b) H. R. H. asks : 1. What is a good material to use to paint a fireplace and also tender where the Japan is burnt away ? A. We know of nothing that would be acceptable on the ironwork of a fireplace but the hard-baking Japan. 2. Has the tunnel under the British Channel ever been begun ? A. About a mile of preliminary tunnel on each side of the channel has been done. The work waits the authority of Parliament.

(10) C. Q. H. asks the strongest wood, in proportion to its weight, that would be suitable for making framework for a flying machine? A. Larch-wood.

[illegible]

(12) W. T. S. asks: How many feet board measure, allowing  $\frac{1}{4}$  of an inch for the kerf of the saw, in a stick of timber 68 feet long, 10 inches by 30 inches square? A. If you sell the stick of timber at board measure, no allowance should be made for resawing, and it should tally 600 feet board measure. If allowance is agreed to for resawing, the stick will ret seven 1 inch boards and one  $\frac{1}{4}$  inch board or plank, and should then tally for the whole stick 300 feet board measure.

(Continued on page viii.)

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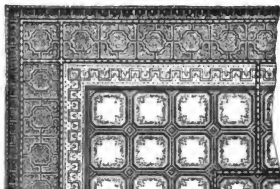
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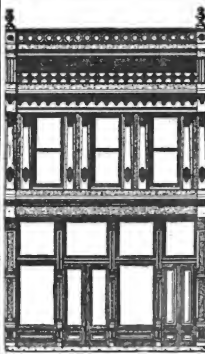
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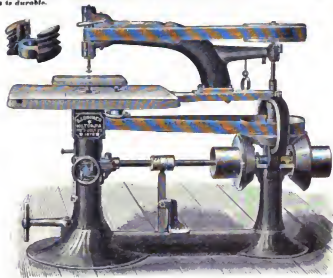


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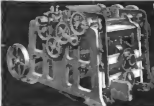


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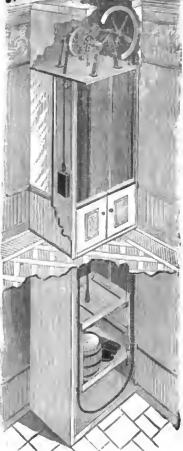






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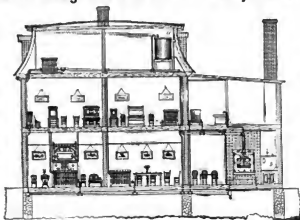


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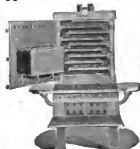
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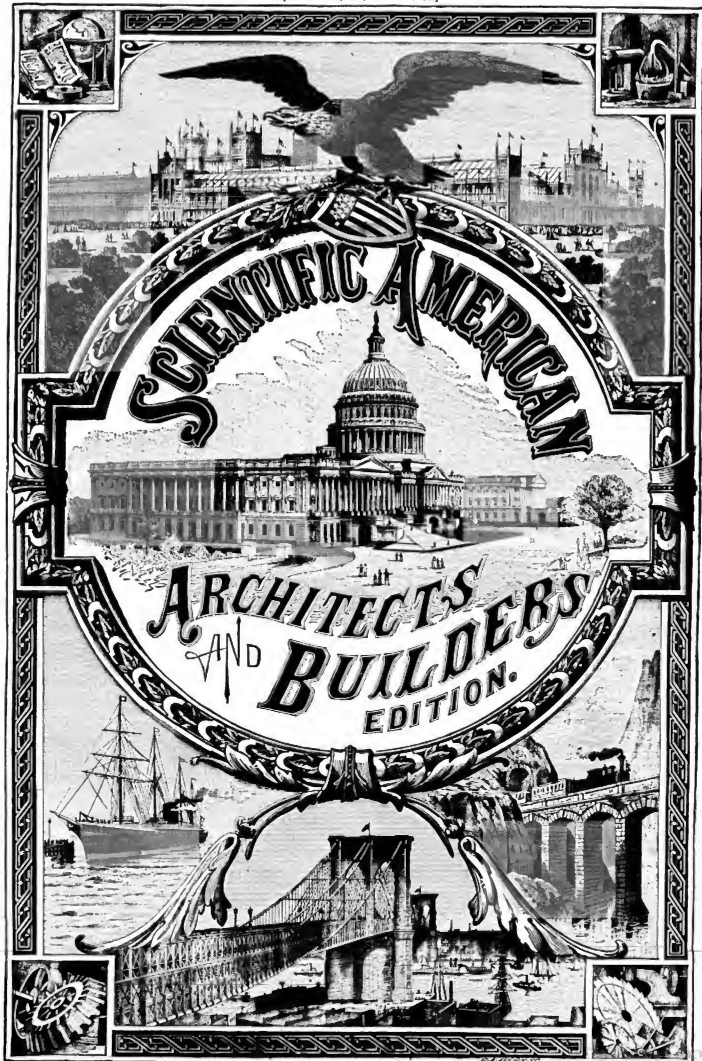
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Augers in sets, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102, 108, 114, 120, 126, 132, 138, 144, 150, 156, 162, 168, 174, 180, 186, 192, 198, 204, 210, 216, 222, 228, 234, 240, 246, 252, 258, 264, 270, 276, 282, 288, 294, 300, 306, 312, 318, 324, 330, 336, 342, 348, 354, 360, 366, 372, 378, 384, 390, 396, 402, 408, 414, 420, 426, 432, 438, 444, 450, 456, 462, 468, 474, 480, 486, 492, 498, 504, 510, 516, 522, 528, 534, 540, 546, 552, 558, 564, 570, 576, 582, 588, 594, 600, 606, 612, 618, 624, 630, 636, 642, 648, 654, 660, 666, 672, 678, 684, 690, 696, 702, 708, 714, 720, 726, 732, 738, 744, 750, 756, 762, 768, 774, 780, 786, 792, 798, 804, 810, 816, 822, 828, 834, 840, 846, 852, 858, 864, 870, 876, 882, 888, 894, 900, 906, 912, 918, 924, 930, 936, 942, 948, 954, 960, 966, 972, 978, 984, 990, 996, 1002, 1008, 1014, 1020, 1026, 1032, 1038, 1044, 1050, 1056, 1062, 1068, 1074, 1080, 1086, 1092, 1098, 1104, 1110, 1116, 1122, 1128, 1134, 1140, 1146, 1152, 1158, 1164, 1170, 1176, 1182, 1188, 1194, 1200, 1206, 1212, 1218, 1224, 1230, 1236, 1242, 1248, 1254, 1260, 1266, 1272, 1278, 1284, 1290, 1296, 1302, 1308, 1314, 1320, 1326, 1332, 1338, 1344, 1350, 1356, 1362, 1368, 1374, 1380, 1386, 1392, 1398, 1404, 1410, 1416, 1422, 1428, 1434, 1440, 1446, 1452, 1458, 1464, 1470, 1476, 1482, 1488, 1494, 1500, 1506, 1512, 1518, 1524, 1530, 1536, 1542, 1548, 1554, 1560, 1566, 1572, 1578, 1584, 1590, 1596, 1602, 1608, 1614, 1620, 1626, 1632, 1638, 1644, 1650, 1656, 1662, 1668, 1674, 1680, 1686, 1692, 1698, 1704, 1710, 1716, 1722, 1728, 1734, 1740, 1746, 1752, 1758, 1764, 1770, 1776, 1782, 1788, 1794, 1800, 1806, 1812, 1818, 1824, 1830, 1836, 1842, 1848, 1854, 1860, 1866, 1872, 1878, 1884, 1890, 1896, 1902, 1908, 1914, 1920, 1926, 1932, 1938, 1944, 1950, 1956, 1962, 1968, 1974, 1980, 1986, 1992, 1998, 2004, 2010, 2016, 2022, 2028, 2034, 2040, 2046, 2052, 2058, 2064, 2070, 2076, 2082, 2088, 2094, 2100, 2106, 2112, 2118, 2124, 2130, 2136, 2142, 2148, 2154, 2160, 2166, 2172, 2178, 2184, 2190, 2196, 2202, 2208, 2214, 2220, 2226, 2232, 2238, 2244, 2250, 2256, 2262, 2268, 2274, 2280, 2286, 2292, 2298, 2304, 2310, 2316, 2322, 2328, 2334, 2340, 2346, 2352, 2358, 2364, 2370, 2376, 2382, 2388, 2394, 2400, 2406, 2412, 2418, 2424, 2430, 2436, 2442, 2448, 2454, 2460, 2466, 2472, 2478, 2484, 2490, 2496, 2502, 2508, 2514, 2520, 2526, 2532, 2538, 2544, 2550, 2556, 2562, 2568, 2574, 2580, 2586, 2592, 2598, 2604, 2610, 2616, 2622, 2628, 2634, 2640, 2646, 2652, 2658, 2664, 2670, 2676, 2682, 2688, 2694, 2700, 2706, 2712, 2718, 2724, 2730, 2736, 2742, 2748, 2754, 2760, 2766, 2772, 2778, 2784, 2790, 2796, 2802, 2808, 2814, 2820, 2826, 2832, 2838, 2844, 2850, 2856, 2862, 2868, 2874, 2880, 2886, 2892, 2898, 2904, 2910, 2916, 2922, 2928, 2934, 2940, 2946, 2952, 2958, 2964, 2970, 2976, 2982, 2988, 2994, 3000, 3006, 3012, 3018, 3024, 3030, 3036, 3042, 3048, 3054, 3060, 3066, 3072, 3078, 3084, 3090, 3096, 3102, 3108, 3114, 3120, 3126, 3132, 3138, 3144, 3150, 3156, 3162, 3168, 3174, 3180, 3186, 3192, 3198, 3204, 3210, 3216, 3222, 3228, 3234, 3240, 3246, 3252, 3258, 3264, 3270, 3276, 3282, 3288, 3294, 3300, 3306, 3312, 3318, 3324, 3330, 3336, 3342, 3348, 3354, 3360, 3366, 3372, 3378, 3384, 3390, 3396, 3402, 3408, 3414, 3420, 3426, 3432, 3438, 3444, 3450, 3456, 3462, 3468, 3474, 3480, 3486, 3492, 3498, 3504, 3510, 3516, 3522, 3528, 3534, 3540, 3546, 3552, 3558, 3564, 3570, 3576, 3582, 3588, 3594, 3600, 3606, 3612, 3618, 3624, 3630, 3636, 3642, 3648, 3654, 3660, 3666, 3672, 3678, 3684, 3690, 3696, 3702, 3708, 3714, 3720, 3726, 3732, 3738, 3744, 3750, 3756, 3762, 3768, 3774, 3780, 3786, 3792, 3798, 3804, 3810, 3816, 3822, 3828, 3834, 3840, 3846, 3852, 3858, 3864, 3870, 3876, 3882, 3888, 3894, 3900, 3906, 3912, 3918, 3924, 3930, 3936, 3942, 3948, 3954, 3960, 3966, 3972, 3978, 3984, 3990, 3996, 4002, 4008, 4014, 4020, 4026, 4032, 4038, 4044, 4050, 4056, 4062, 4068, 4074, 4080, 4086, 4092, 4098, 4104, 4110, 4116, 4122, 4128, 4134, 4140, 4146, 4152, 4158, 4164, 4170, 4176, 4182, 4188, 4194, 4200, 4206, 4212, 4218, 4224, 4230, 4236, 4242, 4248, 4254, 4260, 4266, 4272, 4278, 4284, 4290, 4296, 4302, 4308, 4314, 4320, 4326, 4332, 4338, 4344, 4350, 4356, 4362, 4368, 4374, 4380, 4386, 4392, 4398, 4404, 4410, 4416, 4422, 4428, 4434, 4440, 4446, 4452, 4458, 4464, 4470, 4476, 4482, 4488, 4494, 4500, 4506, 4512, 4518, 4524, 4530, 4536, 4542, 4548, 4554, 4560, 4566, 4572, 4578, 4584, 4590, 4596, 4602, 4608, 4614, 4620, 4626, 4632, 4638, 4644, 4650, 4656, 4662, 4668, 4674, 4680, 4686, 4692, 4698, 4704, 4710, 4716, 4722, 4728, 4734, 4740, 4746, 4752, 4758, 4764, 4770, 4776, 4782, 4788, 4794, 4800, 4806, 4812, 4818, 4824, 4830, 4836, 4842, 4848, 4854, 4860, 4866, 4872, 4878, 4884, 4890, 4896, 4902, 4908, 4914, 4920, 4926, 4932, 4938, 4944, 4950, 4956, 4962, 4968, 4974, 4980, 4986, 4992, 4998, 5004, 5010, 5016, 5022, 5028, 5034, 5040, 5046, 5052, 5058, 5064, 5070, 5076, 5082, 5088, 5094, 5100, 5106, 5112, 5118, 5124, 5130, 5136, 5142, 5148, 5154, 5160, 5166, 5172, 5178, 5184, 5190, 5196, 5202, 5208, 5214, 5220, 5226, 5232, 5238, 5244, 5250, 5256, 5262, 5268, 5274, 5280, 5286, 5292, 5298, 5304, 5310, 5316, 5322, 5328, 5334, 5340, 5346, 5352, 5358, 5364, 5370, 5376, 5382, 5388, 5394, 5400, 5406, 5412, 5418, 5424, 5430, 5436, 5442, 5448, 5454, 5460, 5466, 5472, 5478, 5484, 5490, 5496, 5502, 5508, 5514, 5520, 5526, 5532, 5538, 5544, 5550, 5556, 5562, 5568, 5574, 5580, 5586, 5592, 5598, 5604, 5610, 5616, 5622, 5628, 5634, 5640, 5646, 5652, 5658, 5664, 5670, 5676, 5682, 5688, 5694, 5700, 5706, 5712, 5718, 5724, 5730, 5736, 5742, 5748, 5754, 5760, 5766, 5772, 5778, 5784, 5790, 5796, 5802, 5808, 5814, 5820, 5826, 5832, 5838, 5844, 5850, 5856, 5862, 5868, 5874, 5880, 5886, 5892, 5898, 5904, 5910, 5916, 5922, 5928, 5934, 5940, 5946, 5952, 5958, 5964, 5970, 5976, 5982, 5988, 5994, 6000, 6006, 6012, 6018, 6024, 6030, 6036, 6042, 6048, 6054, 6060, 6066, 6072, 6078, 6084, 6090, 6096, 6102, 6108, 6114, 6120, 6126, 6132, 6138, 6144, 6150, 6156, 6162, 6168, 6174, 6180, 6186, 6192, 6198, 6204, 6210, 6216, 6222, 6228, 6234, 6240, 6246, 6252, 6258, 6264, 6270, 6276, 6282, 6288, 6294, 6300, 6306, 6312, 6318, 6324, 6330, 6336, 6342, 6348, 6354, 6360, 6366, 6372, 6378, 6384, 6390, 6396, 6402, 6408, 6414, 6420, 6426, 6432, 6438, 6444, 6450, 6456, 6462, 6468, 6474, 6480, 6486, 6492, 6498, 6504, 6510, 6516, 6522, 6528, 6534, 6540, 6546, 6552, 6558, 6564, 6570, 6576, 6582, 6588, 6594, 6600, 6606, 6612, 6618, 6624, 6630, 6636, 6642, 6648, 6654, 6660, 6666, 6672, 6678, 6684, 6690, 6696, 6702, 6708, 6714, 6720, 6726, 6732, 6738, 6744, 6750, 6756, 6762, 6768, 6774, 6780, 6786, 6792, 6798, 6804, 6810, 6816, 6822, 6828, 6834, 6840, 6846, 6852, 6858, 6864, 6870, 6876, 6882, 6888, 6894, 6900, 6906, 6912, 6918, 6924, 6930, 6936, 6942, 6948, 6954, 6960, 6966, 6972, 6978, 6984, 6990, 6996, 7002, 7008, 7014, 7020, 7026, 7032, 7038, 7044, 7050, 7056, 7062, 7068, 7074, 7080, 7086, 7092, 7098, 7104, 7110, 7116, 7122, 7128, 7134, 7140, 7146, 7152, 7158, 7164, 7170, 7176, 7182, 7188, 7194, 7200, 7206, 7212, 7218, 7224, 7230, 7236, 7242, 7248, 7254, 7260, 7266, 7272, 7278, 7284, 7290, 7296, 7302, 7308, 7314, 7320, 7326, 7332, 7338, 7344, 7350, 7356, 7362, 7368, 7374, 7380, 7386, 7392, 7398, 7404, 7410, 7416, 7422, 7428, 7434, 7440, 7446, 7452, 7458, 7464, 7470, 7476, 7482, 7488, 7494, 7500, 7506, 7512, 7518, 7524, 7530, 7536, 7542, 7548, 7554, 7560, 7566, 7572, 7578, 7584, 7590, 7596, 7602, 7608, 7614, 7620, 7626, 7632, 7638, 7644, 7650, 7656, 7662, 7668, 7674, 7680, 7686, 7692, 7698, 7704, 7710, 7716, 7722, 7728, 7734, 7740, 7746, 7752, 7758, 7764, 7770, 7776, 7782, 7788, 7794, 7800, 7806, 7812, 7818, 7824, 7830, 7836, 7842, 7848, 7854, 7860, 7866, 7872, 7878, 7884, 7890, 7896, 7902, 7908, 7914, 7920, 7926, 7932, 7938, 7944, 7950, 7956, 7962, 7968, 7974, 7980, 7986, 7992, 7998, 8004, 8010, 8016, 8022, 8028, 8034, 8040, 8046, 8052, 8058, 8064, 8070, 8076, 8082, 8088, 8094, 8100, 8106, 8112, 8118, 8124, 8130, 8136, 8142, 8148, 8154, 8160, 8166, 8172, 8178, 8184, 8190, 8196, 8202, 8208, 8214, 8220, 8226, 8232, 8238, 8244, 8250, 8256, 8262, 8268, 8274, 8280, 8286, 8292, 8298, 8304, 8310, 8316, 8322, 8328, 8334, 8340, 8346, 8352, 8358, 8364, 8370, 8376, 8382, 8388, 8394, 8400, 8406, 8412, 8418, 8424, 8430, 8436, 8442, 8448, 8454, 8460, 8466, 8472, 8478, 8484, 8490, 8496, 8502, 8508, 8514, 8520, 8526, 8532, 8538, 8544, 8550, 8556, 8562, 8568, 8574, 8580, 8586, 8592, 8598, 8604, 8610, 8616, 8622, 8628, 8634, 8640, 8646, 8652, 8658, 8664, 8670, 8676, 8682, 8688, 8694, 8700, 8706, 8712, 8718, 8724, 8730, 8736, 8742, 8748, 8754, 8760, 8766, 8772, 8778, 8784, 8790, 8796, 8802, 8808, 8814, 8820, 8826, 8832, 8838, 8844, 8850, 8856, 8862, 8868, 8874, 8880, 8886, 8892, 8898, 8904, 8910, 8916, 8922, 8928, 8934, 8940, 8946, 8952, 8958, 8964, 8970, 8976, 8982, 8988, 8994, 9000, 9006, 9012, 9018, 9024, 9030, 9036, 9042, 9048, 9054, 9060, 9066, 9072, 9078, 9084, 9090, 9096, 9102, 9108, 9114, 9120, 9126, 9132, 9138, 9144, 9150, 9156, 9162, 9168, 9174, 9180, 9186, 9192, 9198, 9204, 9210, 9216, 9222, 9228, 9234, 9240, 9246, 9252, 9258, 9264, 9270, 9276, 9282, 9288, 9294, 9300, 9306, 9312, 9318, 9324, 9330, 9336, 9342, 9348, 9354, 9360, 9366, 9372, 9378, 9384, 9390, 9396, 9402, 9408, 9414, 9420, 9426, 9432, 9438, 9444, 9450, 9456, 9462, 9468, 9474, 9480, 9486, 9492, 9498, 9504, 9510, 9516, 9522, 9528, 9534, 9540, 9546, 9552, 9558, 9564, 9570, 9576, 9582, 9588, 9594, 9600, 9606, 9612, 9618, 9624, 9630, 9636, 9642, 9648, 9654, 9660, 9666, 9672, 9678, 9684, 9690, 9696, 9702, 9708, 9714, 9720, 9726, 9732, 9738, 9744, 9750, 9756, 9762, 9768, 9774, 9780, 9786, 9792, 9798, 9804, 9810, 9816, 9822, 9828, 9834, 9840, 9846, 9852, 9858, 9864, 9870, 9876, 9882, 9888, 9894, 9900, 9906, 9912, 9918, 9924, 9930, 9936, 9942, 9948, 9954, 9960, 9966, 9972, 9978, 9984, 9990, 9996, 10002, 10008, 10014, 10020, 10026, 10032, 10038, 10044, 10050, 10056, 10062, 10068, 10074, 10080, 10086, 10092, 10098, 10104, 10110, 10116, 10122, 10128, 10134, 10140, 10146, 10152, 10158, 10164, 10170, 10176, 10182, 10188, 10194, 10200, 10206, 10212, 10218, 10224, 10230, 10236, 10242, 10248, 10254, 10260, 10266, 10272, 10278, 10284, 10290, 10296, 10302, 10308, 10314, 10320, 10326, 10332, 10338, 10344, 10350, 10356, 10362, 10368, 10374, 10380, 10386, 10392, 10398, 10404, 10410, 10416, 10422, 10428, 10434, 10440, 10446, 10452, 10458, 10464, 10470, 10476, 10482, 10488, 10494, 10500, 10506, 10512, 10518, 10524, 10530, 10536, 10542, 10548, 10554, 10560, 10566, 10572, 10578, 10584, 10590, 10596, 10602, 10608, 10614, 10620, 10626, 10632, 10638, 10644, 10650, 10656, 10662, 10668, 10674, 10680, 10686, 10692, 10698, 10704, 10710, 10716, 10722, 10728, 10734, 10740, 10746, 10752, 10758, 10764, 10770, 10776, 10782, 10788, 10794, 10800, 10806, 10812, 10818, 10824, 10830, 10836, 10842, 10848, 10854, 10860, 10866, 10872, 10878, 10884, 10890, 10896, 10902, 10908, 10914, 10920, 10926, 10932, 10938, 10944, 10950, 10956, 10962, 10968, 10974, 10980, 10986, 10992, 10998, 11004, 11010, 11016, 11022, 11028, 11034, 11040, 11046, 11052, 11058, 11064, 11070, 11076, 11082, 11088, 11094, 11100, 11106, 11112, 11118, 11124, 11130, 11136, 11142, 11148, 11154, 11160, 11166, 11172, 11178, 11184, 11190, 11196, 11202, 11208, 11214, 11220, 11226, 11232, 11238, 11244, 11250, 11256, 11262, 11268, 11274, 11280, 11286, 11292, 11298, 11304, 11310, 11316, 11322, 11328, 11334, 11340, 11346, 11352, 11358, 11364, 11370, 11376, 11382, 11388, 11394, 11400, 114

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## **-ELECTRIC MOTORS.**

See Classified List of Advertisers in present Number on pages xv and xvi.  
See Classified Index to Advertisers in present Number on page xiv.

# SCIENTIFIC AMERICAN

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## ARCHITECTS

## AND BUILDERS

## EDITION.

Vol. XIV. Subscription, \$2.50 a Year.

NEW YORK, DECEMBER, 1892.

Single Copies, 15 Cents.

No. 6.

### House of the Merits.

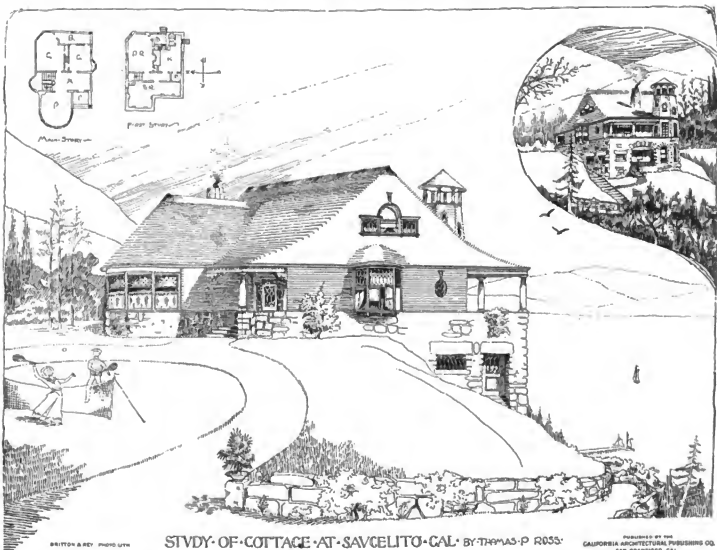
The present number of our Journal completes the year, when an excellent opportunity will be afforded for the entry upon our books of new subscriptions.

One of the distinctive features of our publication is the presentation in every number, both in colors and in half-tone prints, of new and fresh collections of photographic views showing recently built dwellings and other structures, with the floor plans. In this way we place before the reader a great variety of the very latest and most approved forms of construction, not from one locality only, but selected from every part of this great country. Wherever good taste prevails in the display of architecture, especially in the branch pertaining to homes

of new buildings have been and are constantly being erected in all sections of the country from the plans given in the SCIENTIFIC AMERICAN, and as a result there is to be seen on every hand a marked and growing improvement in architectural styles. Builders now aim to select, even for the cheapest houses, the most tasteful designs, and of these the SCIENTIFIC AMERICAN regularly furnishes to them an abundant and satisfactory supply.

When the design of the building is selected and the work of construction begun, the next subject for consideration is the plumbing, the warming, the lighting, the hardwiring, the glazing, the adorning, the painting, the finishing, and finally the furnishing and household fittings of the building. In all of these matters the pages of

feet of soil and 16 feet of loose water bearing shingle. The depth of the tank, including foundations, was 24 feet; the tank foundations were 9 feet below the ordinary river level, and 16 feet below the ordinary flood-level. My first proceeding was to sink a well or sump 3 feet below the foundation of the tank, and in connection therewith. In this well I placed my pumping gear. Having secured the drainage, and the excavation being done, I put in the foundations in the ordinary manner; making the mounds as nearly water-tight as possible under the circumstances. After filling, I allowed the water to remain stationary—giving the concrete ample time to set; and I continued the same process until my work was well above the water-level. I then pumped down, and found innumerable



STUDY OF COTTAGE AT SAGECITO, CAL. BY THOMAS P. ROSS.

PUBLISHED BY THE  
GALLOP & ARCHITECTURAL PUBLISHING CO.  
SAN FRANCISCO, CAL.

and dwelling houses, there the artists of the SCIENTIFIC AMERICAN, with their cameras, do sooner or later make their appearance.

The usefulness and influence of our periodical is now widely and permanently established. Many of those who contemplate the erection of buildings now consult its pages for good plans and elevations, which are here given in numerical profusion.

The practical builder finds the SCIENTIFIC AMERICAN to be almost a necessity for himself and for his customers. With the plans and photographic elevations which we give, the builder is enabled easily to modify or to duplicate any of the structures we illustrate.

The photographs show the exact form, position and details of the principal parts, and the builder is never at a loss how to proceed. Of these facts we have the most abundant and convincing testimonies. Many thousands

of the SCIENTIFIC AMERICAN team with the most valuable information. Here may be found the illustrated announcements of the most reliable manufacturers of every class of materials, goods, and appliances required in buildings. In this department of the paper upward of two hundred engravings are given in every number. The value as a convenience to the reader in having constantly at hand an illustrated, comprehensive directory of the latest productions cannot be overestimated.

### Water-tight Cellars.

This was for a gasholder tank, 73 feet in diameter, built entirely of concrete.

The Richelieu Gas Works are situated on the banks of a single bearing river, called the Omaka; and the site of the tank was 70 feet from the stream. The strata were 8

feet in the foundations and walls of the tank. To overcome this difficulty, I had holes drilled through the foundations and walls at intervals, and in these I inserted tubes from 1½ to 2 inches in diameter, caking them firmly with cement. By this means I relieved the outside pressure, and caused the water to flow through the tubes, and from thence to the sump. After allowing a reasonable time for the concrete to dry, I put on two coats of cement plaster (2 to 1); finishing with a thin coat of pure cement. The whole was well keyed into concrete, and finished up smooth with the trowel. To make my tank thoroughly water-tight, after everything was properly set, I filled up the tubes with cement mortar, and screwed a plug or collar on the end of each; covering the whole with cement mortar. It is now five years since this work was finished, and it is perfectly water-tight.—J. MEIR, *Journal of Gas Lighting.*





## The Scientific American a Help to Builders.

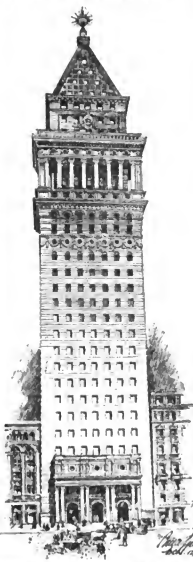
When any one begins to think about building a home, he is apt to say to himself, "I will have the house built just as cheaply as I can, at the same time make it as attractive in exterior and as comfortable within as possible." The next step is to search for plans, and perhaps some friend directs him to the *SCIENTIFIC AMERICAN*. Here, to his surprise, he finds speed before him a wonderful variety of photographs of neatly constructed dwellings, with the plans. First he runs over the most economical houses, those for six hundred, twelve hundred or two thousand dollars. He studies the plans carefully, makes himself familiar with the details, the forms and the appearances, which the photographic plates readily enable him to do. The good wife, the daughters and the sons, all do the same, and in the course of their searchings and studies they find their attention almost incessantly directed toward the better class of houses, of which plans and photographs are also given. And on studying these latter houses, they are found to be so much more comfortable, roomy, and in every way superior that the notion of a "cheap as possible home" has vanished, and the more sensible conclusion is decided upon that "We will have the very best house our means will permit." Hundreds of architects and builders in all parts of the country can testify to this educative influence of our paper upon their customers. Many builders know by experience that by this means jobs which at first promised only fifteen hundred dollars have been raised to four or five thousand dollars.

It makes a leap of difference to an architect or a builder whether he is employed on a wretched little cheap house or on a good, substantial one. Manifestly, then, it is to their interest, as well as that of their customers, to have the *SCIENTIFIC AMERICAN* widely circulated, and its photographic pictures and plans brought everywhere to public notice. Every architect and every builder can do something to aid this good work. Talk about it to friends and customers. Get them to subscribe. It costs only \$2.50 a year. It is the cheapest, finest, and most useful architectural work ever produced. Every number is intrinsically worth more than the price of the year's subscription. Where can a builder find in one number a dozen plans of attractive new houses, with splendid plates in color, for \$2.50? They are not to be had except in the *SCIENTIFIC AMERICAN*, and for the money stated, instead of our number, we give a year's subscription. We say specially to architects and builders, You were never before supplied with a paper that did you so much good, that tended so much to help you to business and to profitable contracts, as the *SCIENTIFIC AMERICAN*. We, therefore, ask you to do all you can for us. Remember, the more subscribers we have, the more we can beautifully and lavishly our publication, and thereby increase your advantages.

## DESIGN FOR A THIRTY STORY BUILDING!

The *Sun* newspaper establishment occupies a comparatively small corner in Printing House Square, New York, and its present building looks quite diminutive in comparison with its immediate neighbors. For example, standing directly opposite on the northerly side of the narrow Frankfort street is the towering and shining dome of the *World* newspaper, probably the highest building now in the city. Next, on the south, and on the same block with the *Sun*, is the massive Tribune building;

building that would beat its neighbors in point of height, was a puzzle. This has been happily settled by Mr. Bruce Price, one of our well known architects, of this city. He has designed a *Sun* office building of thirty stories, sketch of which we give, the erection of which



DESIGN FOR A THIRTY STORY BUILDING.

will overtop the highest of our high buildings, and make the *Sun* as famous architecturally as it is editorially; for, among all our daily newspapers, the *Sun* stands at the top of the heap.

random, and the building above is sheathed and covered with shingles. Roof shingled and stained dark green. Dimensions: Front, 76 ft.; side, 43 ft. 8 in., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The several rooms communicating as they do, make a most attractive vista of the entire floor. The walls and ceilings of reception hall and dining-room are wainscoted and elaborately paneled. The broad, low staircase, antique mantel, large, open fireplace and seats are the features of hall. The fireplace is built of brick, with hearth laid of same. The windows on staircase landing are glazed with delicate tinted glass, shedding a soft and pleasant light over upper and lower hall. This hall and parlor are trimmed with white wood, treated with ivory white. Library, trimmed with sycamore, is provided with book case, window seats and fireplace, with ceilings of Mexican onyx, tiled hearth and hardwood mantel. Dining-room is trimmed with mahogany. It contains a bay window, fireplace, paneled divan and a buffet, handsomely carved. Hardwood floors. Butler's pantry is trimmed with ash, and it is fitted up with all the usual fixtures. Servants' hall and staircase are private from cellar to third floor. Kitchen and pantry are trimmed and wainscoted with white wood, finished natural and furnished complete. Store pantry has an ice box built in without side entrance thereto. The second floor contains five bedrooms, large closets, bath and dressing rooms. The bedrooms are trimmed with hardwood and treated in colors respectively. Bathroom is fitted up in a handsome manner. It has a tiled floor and wainscoting. Four bedrooms and servants' bath on third floor. Canceled cellar contains furnace, laundry and other necessary apartments. Mr. J. William Beak, architect, Mason building, Boston, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the *SCIENTIFIC AMERICAN*.

## COTTAGES OF LOW COST.

We present some cottages of low cost, recently completed for Messrs. Edmunds & Swan, at Bridgeport, Connecticut. The treatment of the design is satisfactory. A particularly attractive elevation, with a really well arranged plan, makes it one which could be utilized with advantage. The construction used in the execution of this design is of the usual kind, but thoroughly substantial. The foundation is built of concrete, and the underpinning of brick, laid in red mortar, with bluestone trimmings. The exterior framework is sheathed, papered, clapboarded and painted pearl gray, with bottle green trimmings. Roof shingled. Dimensions: Front, 19 ft. 6 in.; side, 27 ft. Height of ceilings: Cellar, 6 ft. 8 in.; first story, 8 ft. 5 in.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with white wood, finished natural. Doors and windows have beaded casings and turned angle hills. Hall is lighted by a window glazed with colored glass. Staircase is provided with posts, rail, etc., turned out of ash. Parlor and dining-room have hardwood mantels of best design. Kitchen and pantries are wainscoted and trimmed with North Carolina pine, finished natural with hard oil. These apartments are furnished complete. There are three bedrooms, large closets and bathroom on second floor, the latter wainscoted and provided with the usual fixtures. One bedroom and ample storage on third floor. Cemented cellar contains



RESIDENCE OF MR. HOWARD BELL, PEACHTREE ST., ATLANTA, GA.—G. I. NORMAN, Architect.—From Southern Architect.

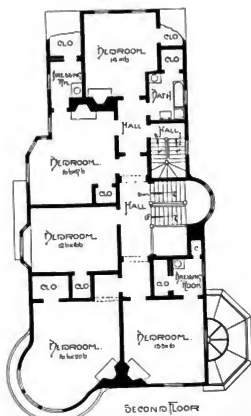
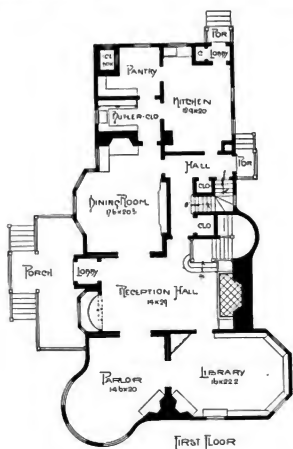
next thereto, on the south side of the Square, is the new Times building, a high and imposing structure. The *Sun* also remains quartered in its original little house of ancient date, which is still very useful and sufficient, except as to exterior show and grandeur. How to remedy the matter, how to erect upon so small a ground space a

## A RESIDENCE AT NEWTON HIGHLANDS, MASS.

On page 78 will be found illustrations of a residence, recently erected for W. E. Peabody, Esq., at Newton Highlands, Mass. The design is of the modern Colonial style, is picturesque and has many interesting features. The underpinning is built of quarry face stone, laid up at

landry, furnace and other apartments. Cost \$1,600, including furnace. Mr. A. M. Jenks, architect, Bridgeport, Conn.

Our engraving was made direct from a photograph of the building, taken specially for the *SCIENTIFIC AMERICAN*.



A RESIDENCE AT NEWTON HIGHLANDS, MASS.—See Page 77.





A RESIDENCE AT SPRINGFIELD, MASS.

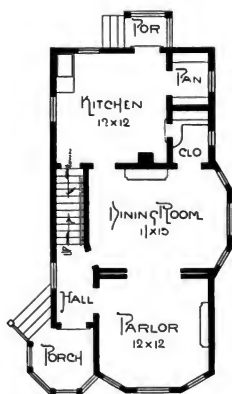




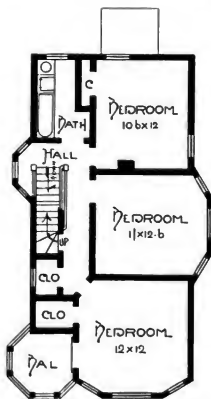


A DWELLING AT WARBERTH PARK, PA.

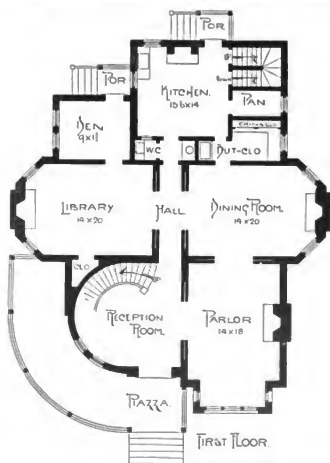




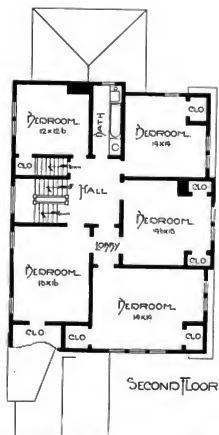
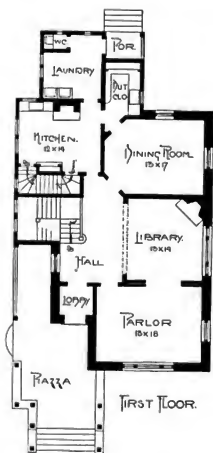
FIRST FLOOR.



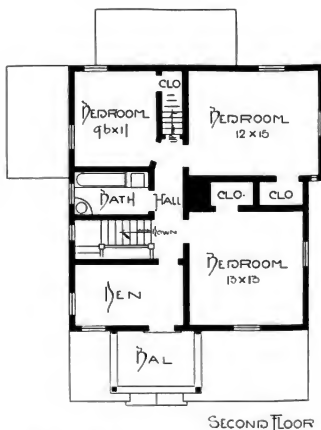
SECOND FLOOR



A RESIDENCE AT BRIDGEPORT, CONN.—See Page 56.

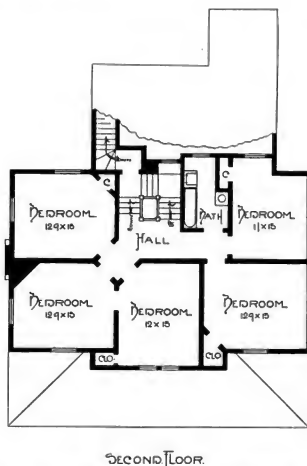


A COTTAGE AT ST. DAVIDS, PA.—See Page 84.



A DWELLING AT SPRINGFIELD, MASS.—See Page 86.





A DWELLING AT ST. DAVIDS, PA.—See Page 86.

## How to Catch Customers.

When a customer calls to talk house to an architect or builder, one of the readiest means to inform and interest him is to show the various numbers of the *SCIENTIFIC AMERICAN*. These are replete with photographic pictures of new and tasteful dwellings and plans. Our customer looks at this one and that, until he finds a plan that nearly suits his fancy, except that the kitchen is not just as he could wish, or the hallway, or that closet, or "I should like it better if a dormer window were there," or some other minor change were made. To which the builder frankly replies that he understands his wishes to a dot, and will be glad to make up a plan for him; will have it ready to-morrow; and, moreover, "it ain't cost you a penny." This liberal and agreeable treatment is highly appreciated by the customer. After his departure our architect or builder whips out his tracing paper, follows the plan selected, puts in the few changes suggested, perhaps adds a front elevation of the house, all involving but a short time. The customer, on calling, is delighted. The drawings look like new plans specially made for him; is satisfied this architect or builder is the man for him. His mind is at once made up, and the bargain soon settled and closed. Such, in brief, is the

objects they purport to illustrate. You cannot do a better thing for yourself than to subscribe for this paper. You cannot do a better thing for your fellow architects and builders and for your neighbors than to urge them to subscribe.

The circulation of the *SCIENTIFIC AMERICAN* stimulates and promotes the building of new and improved houses. We know of towns where every builder is a subscriber, and all are full of business. People who see illustrations of handsome buildings are greatly influenced thereby. A notable improvement in architecture takes place in all towns and villages where the *SCIENTIFIC AMERICAN* freely circulates. Improved architecture increases the value of property. This is a self-evident proposition. Therefore, do all you can to boom this important and most useful periodical. This number closes the year. The next number begins a new year. Now is the time to renew your own subscription and to add another for your friend. Can you think of a better holiday present for him?

## A DWELLING AT WARRENTH PARK, PA.

Our engravings on page 85 present a dwelling erected for L. H. Trotter, Esq., at Warrenton Park, Pa. The first

rooms on third floor. Cemented cellar contains furnace, laundry, etc. Cost \$4,478 complete. Mr. C. W. Macfarlane, architect, same place.

Our engraving was made direct from a photograph of the building, taken specially for the *SCIENTIFIC AMERICAN*.

## A COTTAGE AT ST. DAVIDS, PA.

On page 86 we illustrate a dwelling recently completed by Messrs Wendell & Smith, at St. Davids, Pa. The design is of the Queen Anne style, and it has many pleasing features, and a plan which is a unique model. The rooms are fair sized and well arranged for light and comfort. A shady porch at one side, with a return to the front entrance. The under-planning and balustrade to front piazza are built of rock-faced limestone laid up at random, and by pebble-dashing the first story and painting it Colonial yellow, a quaint effect is obtained; the second story and gables are shingled and stained sassa. Roof is covered with blue slate. Dimensions: Front, 33 ft. 6 in.; side, 37 ft. 6 in., exclusive of front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Parlor is trimmed with white wood and treated in Ivory white. Hall,



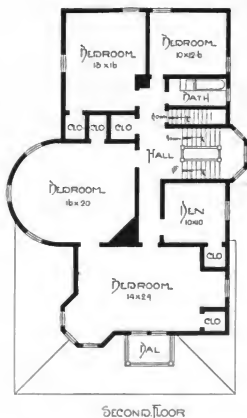
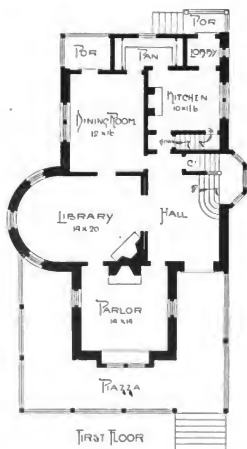
## A RESIDENCE AT SPRINGFIELD, MASS.

way it works, and we have not related any fairy story. It is the short narrative of hundreds of actual instances. We say to architects and builders everywhere, Your interests are sure to be promoted if you keep on hand and make yourselves familiar with the numbers of the *SCIENTIFIC AMERICAN*, so that you can readily display them to your customers, and point them to examples such as they require. There is no other work like it, none that has so wide a circulation among builders, none that does them so much practical and financial benefit. It assists to educate customers up to the point of having good houses, and it does this quickly, for it employs the most effective of all means for rapid education, namely, the attractive and truthful picture. Nearly all the illustrations given are photographic plates made from the buildings, showing all the minute details. These plates are specially prepared for the *SCIENTIFIC AMERICAN*. Every number presents a new and fresh supply. They are not fancy sketches, but genuine photo plates of the

story is built of local bluestone, rock faced, and laid up at random, while the second story and gables are shingled and painted olive-yellow with bottle-green trimmings. Roof shingled and stained a reddish-yellow. Dimensions: Front, 39 ft. 6 in.; side, 34 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with ash, finished natural. Hall has a very pretty staircase, with ornamental newel, posts, balusters and rail. A bay window is thrown out at first landing, glazed with stained glass. Floors of hardwood. Parlor and library have open fireplaces, furnished with tiled hearths and facings. These fireplaces are also fitted up with hardwood mantels. Kitchen and pantry are wainscoted, the former being provided with fireplace for range, sink and boiler, large enough to admit ice box. The pantry is also fitted up in a first class manner. There are four large bedrooms, den and bathroom on second floor. Bathroom is wainscoted. Three bed-

library and dining room are trimmed with antique oak, the former being provided with an ornamental staircase with carved newels. This staircase is lighted by stained glass windows. Hall and library are divided by an arch, with transom filled in with spindle work. The fireplace in library is built of brick, with hearth laid of same, and it is provided with a hardwood mantel. Kitchen, laundry and pantry are trimmed and wainscoted with white wood, finished natural, and are furnished replete. The second floor contains five bedrooms, large closets and bathroom, all trimmed with white wood, finished natural. Bathroom wainscoted. Floors of hardwood, laid in narrow widths. Three bedrooms and storage on third floor. Cemented cellar contains furnace and other necessary apartments. Cost \$3,500 complete. Messrs. F. L. & W. L. Price, architects, Philadelphia.

Our engraving was made direct from a photograph of the building, taken specially for the *SCIENTIFIC AMERICAN*.



A DWELLING AT WARBERTH PARK, PA.—See Page 84.

## A DWELLING AT ST. DAVIDS, PA.

We present on page 88 a dwelling, Colonial in treatment, recently erected for W. A. Barlow, Esq., at St. Davids, Pa. The design is excellent. It has a spacious piazza, and place showing many large rooms, and handsomely furnished with the usual fixtures in the best possible manner. The underpinning and balustrade to piazza are built of rough-faced bluestone. The ground floor is finished in red mortar. The exterior wall to parlor is built of rough stone covered with plaster, pebble-dashed and painted Colonial yellow, with good effect; the remainder of first story is built of wood, clapboarded and painted Colonial yellow, with ivory white trimmings. Second and third stories are shingled and left to weather finish. Roof shingled. Dimensions: Front, 44 ft.; side, 41 ft., not including piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. 7 ft.; parlor, library and dining-room are trimmed with antique oak. Hall is lighted effectively by stained glass windows, and it contains a very handsome staircase with carved newels. Parlor, spacious, is provided with a fireplace, furnished with a tiled hearth and a hardwood mantel. Kitchen, laundry and pantry are trimmed and wainscoted with white-walnut, finished natural. Two apartments are furnished ready. The second floor is also trimmed with white-walnut, finished natural, and it contains five large beds and bathroom. Bathroom is wainscoted. There are two bedrooms on third floor, besides ample storage. Hardwood floors. Windows glazed with plate glass. Ceaseless cellar contains furnace and other apartments. Cost \$20,000 complete. Messrs F. L. and W. B. Price, architects, 721 Walnut street, Philadelphia, Pa.

Our engraving was made direct from a photograph of the building, taken specially for the **SCIENTIFIC AMERICAN**.

## The Education of Customers.

This country is well supplied with architectural papers, many of them ably conducted, of superior value as instructors of architects, exhibiting the theory, mathematics, principles, practice, rise and progress of architecture from the earliest times to the present day. One of these works is quite limited, being confined chiefly to purely professional architects, a comparatively small class, comprising throughout the entire country probably not over three thousand. The **SCIENTIFIC AMERICAN** occupies quite a different field. It aims principally to educate the customers of architects and builders. This it accomplishes by placing before them a constant succession of fresh and splendid illustrations of attractive buildings and plans. The beneficial influence of this method is very great, very practical, and is amply felt by architects and builders in every part of the country. Their services are in greater demand because their customers, no longer satisfied with cheap and ordinary buildings, now ask for the latest, the newest, and the best designs, such as the **SCIENTIFIC AMERICAN** brings to them.

Our paper goes to the masses of the people, who love to look at and study the representations of good buildings.

Where the **SCIENTIFIC AMERICAN** freely circulates the architects and builders of the age properly become intelligently improved; and everybody knows that property, if attractively improved, is increased in value.

The **SCIENTIFIC AMERICAN** has by far the largest circulation of any architectural paper in the world, because it not only goes to architects and builders, but also to their customers, who rarely exceed the former number. This, also, is the reason why the **SCIENTIFIC AMERICAN** has the largest advertising patronage of all the architectural papers. It is these customers who order and pay for the plans, and the buildings, and the plumbing, the painting, the hardware, the wallpapering, the papering, the heating, the lighting, the decorating, the finishing, the furnishing, and every other blessed thing that is used or placed within or without the building. "We get good returns for money spent in the **SCIENTIFIC AMERICAN**," say advertisers, and the agents of the paper.

When our Builders' Edition first appeared, nearly all the architects were down upon it. They said we gave away their plans free to the public, and the effect would be to take bread from their mouths. But they now find, by actual experience, they were mistaken. The **SCIENTIFIC AMERICAN** at present goes through the business of educating their customers, and creating a demand for the higher and more profitable class of plans and designs.

## Erection of Additional Buildings.

Does the payment of the usual 5 per cent. commission on the design and erection of any given building entitle the owner thereof to build other exactly similar buildings without further payment of commission to the architect?

By R. J. LANE.

The answer to this question must, I think, be in the affirmative. If an architect carries out a work and is paid a full commission, there is an end of the matter legally, and, I think, equitably. If a client is so enamored with the result that he wishes to repeat the design, why should he not do so? Do not architects appreciate the ideas,

manners, and designs of other architects without compensation and without acknowledgment? To take the case of the late Mr. Norman Shaw, the ground-floor arches of Mr. Norman Shaw's charming building, at the corner of St. James Street and Pall Mall, been copied, reproduced, and parodied in London and the provinces? Taking the case of this distinguished artist alone, is it not notorious that what he does today seems of his humble admirers will be trying to do to-morrow? The fact stands Norman Shaw as a leader, and in tribute to his genius. Are there not other architects whose work is much admired, who trade, as it were, on the ideas of the past? I have a distinguished architect who would not admit a detail, whether of a molding or a capital, of carrying, to leave his office until he had satisfied himself that it was correctly inspired by a duly authorized precedent. A client wishing to build a country mansion was formally confronted with a book containing "the orders" and asked to make his selection. If he ventured to suggest any unauthorized addition or omission, he was promptly set down as a Goth.

Architects, for the most part, have for long been engaged in repeating the ideas of others without acknowledgment, at least so far as design is concerned. The provision of architecture has indeed been conducted for too long to great an extent as if original thought were almost a crime. A book published in the early part of the century bears the title "The Application of the Five Orders of Grecian Architecture to the Steam Engine," and contains a distinguished architect, lecturing in the Normal College of Science last year to students, extolled the use of the Queen Anne style because it allowed small squares and lead lights to be introduced. All this brings me to the point, as I am contented, architects without limitation trade on the ideas of others, should living architects should not their clients do the same?—*The British Architect*.

## A RESIDENCE AT BRIDGEPORT, CONN.

Our plate on page 89 illustrates a residence erected for Goodwin Biddard, Esq., on Golden Hill, at Bridgeport, Conn. The design is excellent; it combines both a pleasing exterior and a well arranged plan. It is built of local brick, laid up in red mortar. Brownstone trimmings. All woodwork painted red. Roof slated. Dimensions: Front, 40 ft.; side, 37 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft. 7 ft.; third, 8 ft. Hall is trimmed with black walnut. It contains an ornamental staircase turned oak. Parlor is paneled and wainscoted. The hall has a paneled wainscoting. Parlor is treated in old ivory-white. It is provided with an open fireplace, furnished with hearth and facings of Mexican onyx and a mantel of excellent design. Library is trimmed with black walnut, and contains book cases. Each has hardwood floors. Dining-room is furnished with tiled hearth and facings and cabinet mantels. Dining-room has a paneled wainscoting, and den provided with a parquet floor. Kitchen and pantries are wainscoted and fitted up complete. Second floor contains three bedrooms, a servant's bedroom and two bathrooms, the latter wainscoted with black walnut and furnished complete. The halls on second floor are trimmed with black walnut, while the remainder of the woodwork is treated in colors. Three bedrooms and a bathroom are on third floor. Connected with the house, laundry and other apartments. Mr. David R. Brown, architect, New Haven, Conn.

Our engraving was made direct from a photograph of the building, taken specially for the **SCIENTIFIC AMERICAN**.

## A DWELLING AT SPRINGFIELD, MASS.

We publish on page 89 illustrations of a dwelling recently erected for Horace Towne, Esq., at Springfield, Mass. The design presents a pleasing exterior, while the plan is a conventional arrangement of rooms. Foundations, underpinning, brick. First and second stories are clapboarded and painted pearl gray, with trimmings of a darker shade. Gables, shingled and painted similar. Roof, shingled and painted red. Dimensions: Front, 36 ft.; side, 35 ft., not including piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 8 ft. Hall is trimmed with ash. It contains an ornamental staircase turned oak of similar wood. This hall and staircase are lighted by a stained glass window on first landing. Parlor and dining room are trimmed with oak. The parlor contains an open fireplace, furnished with tiles and a hardwood mantel. Kitchen and its apartments are wainscoted and furnished complete. There are three bedrooms, den and bathroom on second floor, and the third contains two bedrooms and storage. The apartments are finished in cherry. Ceaseless cellar contains furnace, laundry and other necessary apartments. Cost \$20,400 complete. Mr. A. R. Root, architect, same place.

Our engraving was made direct from a photograph of the building, taken specially for the **SCIENTIFIC AMERICAN**.

## Concave Sounding-Boards.

When the church at Attlecliffe-on-Darwell, near Sheffield, was opened in 1826, it was found that the speaker's voice was rendered so indistinct and confused,

as to be scarcely audible, and the common sounding-board was tried, but with very imperfect success. The body of the church is 86 feet long and 28 feet wide, but the extreme length is increased to 105 feet by an elliptical recess at the east end, 32 feet wide and 10 feet deep. The extreme height from the floor to the roof is 36 feet, and the roof is groined and vaulted. In the hope of overcoming the difficulty the pulpit was placed in several difficult situations, but that finally chosen was in the centre of the church, 15 feet in advance of the altar rails; the floor of the pulpit was about 9 feet above that of the church. All other means having failed, the Rev. Mr. Blackman conceived that the object might be attained by the use of a concave parabolic sounding-board, so placed as to intercept and reflect to a distance the sound that would otherwise escape behind the speaker and echo in the vaulted roof. The experiment succeeded perfectly, and similar sounding-boards have been erected in other places with great advantage. The Rev. W. F. Smith, Jacksonian professor in the University of Cambridge, had one put up in his church, and stated that he could by its assistance converse in a low whisper with a person in any part of the building. He recommended that the mouth of the speaker should be a little behind the focus of the reflector. Mr. Blackburn's reflector or sounding-board was made of pine wood. The surface was concave, and was generated by half a revolution of one branch of a parabola on its axis. The axis was inclined forward at an angle of about 10 degrees, or 15 deg. to the plane of the floor, so that the sounding-board was placed so that the chief light behind the speaker. Models of the pulpit and sounding-board were exhibited to the Royal Society in 1828. In a pamphlet, published in 1829, entitled "Description of a Parabolic Sounding Board erected in Attlecliffe Church," Mr. Blackman concludes by suggesting whether, in erecting a new church, it might not be advisable to give to the east end of the building itself the form of a parabolical concave, and to place the pulpit in its focus.—*The Architect*.

## Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures here illustrated, on application to the architect. We have plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.

J. J. C. says: We are building a new church, and want, if possible, to have put in the latest improvement for "making the deaf to hear." I thought some contrivance could be arranged for one pew in connection with the pulpit, so that the deaf could all sit in that pew and have the advantage of being in direct communication with the speaker. Do you know of any invention, simple and cheap, for the purpose, that has been proved a success? I would esteem it a favor if you would inform me on the subject—the probable cost of the same.

A.—One of our most successful devices for the purpose you mention, that we know of, was in a church in New York, N. J., where a reciting horn was placed at the pulpit desk, and a tube was extended from the horn under the floor to the pew. This enabled the pastor's wife, who was very deaf, to hear the preacher's voice—a privilege she had not enjoyed for many years prior to the placing of the tube. Perhaps something of this kind would answer your purpose. The cost would be small.

## A High Railway Bridge.

The highest railroad bridge in America, and the third highest in the world, has just been completed. It spans the Peconic river, near the Rio Grande canyon, in southwestern Texas.

The bridge was built by the Phoenix Bridge Company, of Peasany, Irwin, for the Southern Pacific Company, at a cost of upward of \$300,000. The length of the bridge is 2,180 feet, and its height from the base of the piers to the base of the rail is 350 feet. It has forty-eight spans, nearly all of which are iron-plate girders, alternately thirty-five feet and sixty-five feet in length. In the centre, directly above the bed of the Peconic river, is a cantilever span, 195 feet long. Piers, 37 feet high at the base, and 19 x 35 feet at the top, supporting the bridge, rest upon stone ledges or rock foundations. The weight of the iron used in its construction was 3,640,000 pounds. The designing and construction of the bridge were so skillful and accurate that when connection was made in the centre of the cantilever span, the two ends of the bridge met with a variation of only five-sixths of an inch.

The Southern Pacific Company, by the building of this bridge, avoids the Rio Grande canyon, and shortens its line by a distance of twelve miles.

Flinders Petrie, the Egyptologist, has gathered a number of utensils including that Egyptian hand saw used with tools considered modern. Among them are solid and tubular conium-tipped drills, and straight and circular saws and chisels described as "not a bit inferior to those now used."

## LORD TENNYSON.

The recent death of Lord Tennyson, Poet Laureate, brings to a close the career of probably the greatest literary genius of the present century. Alfred Tennyson was born August 6, 1809, at Somersby, and died at Aldworth, Sussex, October 6, 1892, being a little over 83 years of age. He was the son of Rev. Dr. G. C. Tennyson, rector of the church at Somersby. Alfred Tennyson was educated at Cambridge, and soon became distinguished for his poetical compositions, which increased in power and beauty with maturing years. In 1850 he was appointed Poet Laureate in succession of Wordsworth. In 1864 he accepted a peerage of the United Kingdom, with the title of Baron Tennyson. Of his many portraits, one of the most pleasing is that taken when he was a youth of 22 years, painted by Sir Thomas Lawrence, an engraving of which is here presented.

Among the Lincolnshire woods, about half way between the old market towns of Spilsby and Horncastle, lies the little village of Somersby, clustered about a low, square-towered church, with its rough, overgrown churchyard, in which there still rises unbroken an old Norman cross. To this quiet living (the village at that time numbered but sixty inhabitants) there was presented eighty-five years ago a young clergyman named George Clayton Tennyson, who had but recently married a daughter of the Rev. Stephen Fyche, vicar of the neighboring town of Louth. The living was held in connection with those of Grimsby and Bag Enderby; and at Somersby Rectory, on August 6th, 1809, was born Alfred Tennyson, the late Poet Laureate. The Rev. G. C. Tennyson, LL.D., came of an old family which derived from the blood-royal of England in the person of Edward III. His father was a wealthy attorney, possessed of the fine estate of Bayona Manor, in Lincolnshire.

The Rector of Somersby was a man of many accomplishments, of a handsome presence, which he transmitted to his sons. His wife, too, was highly gifted, and of a poetical temperament. Mrs. Richmond Ritchie describes her as "a sweet and gentle, and most imaginative woman; so kind-hearted that it had passed into a proverb, and the wicked inhabitants of a neighboring village used to bring their dogs to her windows and leave them in order to be bribed to leave off by the gentle lady, or to make advantageous bargains by selling her the worthless ones." As years passed the family circle increased in number, and

Rectory. Alfred was a lively and reserved, but Charles was always in good spirits and full of childish energy. But it is upon Alfred that later attention is centered.

In these early years the boys were sent to school at Cadney's village seminary, in Holywell Glen, whither they had a fresh, invigorating country walk upon a summer morning. But, in the year of Waterloo, Alfred was con-

in the frons of his native shire. Those "glooming flats," that "dark fens," that low-lying group where

"For voices no other tree did mark  
The level waste, the rounding grove,"

all have their origin in Lincolnshire. And in Locksley Hall, too, the same scenery occurs:

"Dreary glens about the moorland flying o'er Locksley Hall;  
Locksley Hall that in the distance overlooks the sandy tracts,  
And the hollow oaks ridges roaring into cataracts."

Iron mementoes throughout his works proclaim the abiding marks of these early years. He first drank at the breasts of Nature in this county, and though his eye was ever keen, and his observation faithful throughout life, the impressions of his youth remained strongest to the end. Close by the garden in which he idled many of his days in dreamful meditation, runs the brook so famous in song, that brook with

"The brimming wave that swam  
Through quiet meadows round the mill,  
The sleepy pool above the dam,  
The pool beneath the never still."

It was a happy, but impetuous time—this at Somersby; and the boys wanted little but pocket money. And so it happened that one day, as they were sitting in the saddle room, discussing the proudest of their struggle for life, the old coachman overheard them. Sympathizing with the situation, he was reminded of the verses that his young masters were continually throwing off, and offered a suggestion that they might perhaps be transmitted into gold. Whereupon the brothers leaped to the idea, and issued their first copy, not such poems as a crowd best to them, which were subsequently sent to a Mr. Jackson, of Louth, who gave for the copyright—some say ten, some twenty pounds. Such was the origin of *Poems by Two Brothers*, a thin volume of two hundred and twenty-eight pages, which appeared in print at the close of 1830. It is a very rare little book now, and great prices have been paid for the remaining copies. But in the hour of its birth it attracted slight notice, and no doubt by the time that the brothers had finished the tour of the Lincolnshire churches, upon which they spent their literary earnings, they had ceased to think great things of their excursion into the land of letters.

In October, 1828, Charles and Alfred joined their elder



TENNYSON AT TWENTY TWO.

sidered sufficiently advanced to be moved to Louth Grammar School, where he and Charles stayed for some four years under the tutelage of a Mr. Waite, who seems, from all accounts, to have been a Tartar with the birch. Alfred was twelve years old when his parents decided to move both him and his brother Charles to the Rectory home again. And so the old unrestrained life began again—dullatory lessons under the guidance of



ALDWORTH, SUSSEX, THE HOME OF LORD TENNYSON.

there were seven brothers (of whom Alfred was the third) in play in the old rectory garden at the faithful game of "King of the Castle," which seems to have been their favorite. Five daughters also were born to Dr. Tennyson. But a large family is wont to separate into special friendships, and two of the little Tennysons—Charles and Alfred—seemed to have been drawn together by a peculiar sympathy. Charles (afterwards Charles Tennyson Turner) was a year the elder, and in the nursery days he was the more advanced and the more popular with visitors at the

their father and a Roman Catholic priest, long country rambles, and frequent piques, smoked, it may be, all too early. The influence of this time upon Alfred Tennyson's mind, and his work, can scarcely be overestimated. It is ever the early years that make the deepest impressions upon an imaginative nature, and Tennyson's poems are full of echoes from his Lincolnshire home. The county is not of the prettiest, but it includes a variety of scenery, and that curious effect of melancholy which is so striking in *Mariana* has been caught from the poet's experience

brother, Frederick, at Trinity College, Cambridge. The latter was himself a poet of much sweetness, and at the time was a student of distinction at the University. At first the changes from the quiet seclusion of Lincolnshire found them shy enough, but in a very little time Alfred was among his peers. There was at that time a body of twelve in the College, nicknamed the "Apostles," who met from week to week to discuss political and literary questions; and into this society Alfred was very shortly elected.



## A COMPLETE STEEL HOUSE FRONT.

The accompanying illustration shows a complete modern store front constructed of steel, manufactured by Messrs. Mesker & Bros., St. Louis, Mo. This front is made up as follows: 25 feet cast iron sill course, 6 inches

frames, with sash, for upper stories; and all glass for first, second, and third stories to be of double strength. The net price of such a front free on board cars at St. Louis is \$300.

These manufacturers make and ship over 600 fronts annually, from 10 to 300 feet in width and from one to five stories high. The firm have given these metal fronts their most careful study for the past thirty years, and are convinced that they are now the best, cheapest, and most elaborate fronts in the market. The construction is such as to enable any ordinary intelligent mechanic to put them up without difficulty, as a set of explicit instructions is sent with every shipment. The firm are also manufacturers of a large line of architectural sheet metal and structural wrought iron work.

THE R. F. STURTEVANT CO., Boston, Mass., have printed a second edition of 10,000 copies of their 300 page General Catalogue No. 61, which describes the uses of their blowers, exhausters, engines, forges, and heating and ventilating apparatus, and they desire to place a copy in the office of every superintendent, purchasing agent, engineer or manufacturer using such machinery. It will be mailed free of charge.

THE AMERICAN RADIATOR COMPANY, Chicago, has just issued a new pocket catalogue describing the principles and most popular styles of radiators made by the company. It is an elegant and instructive little volume, which should be in the hands of all who have or design putting in steam or hot water heating apparatus. The factories of the company are at Detroit and Buffalo, with general offices at Chicago, Boston, Minneapolis and St. Paul.

## AN IMPROVED WOOD WORKING MACHINE.

The panel raiser shown in the illustration is unusually heavy, weighing 1,300 pounds, and the frame is one solid casting, making it very firm and rigid.

An important improvement on this machine is in the kind of cutters used, and their arrangement. On all of the old style machines four knives are used, being litted on the heads; but on this panel raiser two patented cutters are used, which are solid and screw on the arbors, permitting of such quicker adjustment, and can be run at much higher speed. These make a shear cut, and a better grade of work can in consequence be done on cross-grained stock and across the grain of lumber.

The cutters are arranged one in front of the other, and can be adjusted in either direction for different work. Each cutter has an independent pressure shoe, which holds the work perfectly rigid. This machine will raise a panel from  $\frac{1}{4}$  to  $\frac{1}{2}$  inches

on one or both sides, at one operation, without change of cutters, and will also make a panel for  $\frac{1}{4}$  inch as successfully as for a  $\frac{1}{2}$  inch. The machine is manufactured by the Williamsport Machine Company, Williamsport, Pa., U. S. A.

## IMPROVED RANGE BOILERS.

In making the boiler shown in the accompanying illustration two shells are used, without seams, the head and sides being in one piece. They are cold drawn from circles of copper and about one-eighth to three-sixteenths of an inch thick. The only joint is in the center, where the two shells are telescoped and further secured by a band of heavy copper shrunk on the out-



RANGE BOILERS.

side. Security from collapse is afforded by the use of a strong interior spiral support, as shown in one of the views, the support running the entire length of the boiler. These boilers are made by Messrs. Randolph & Clowes, Watertown, Conn.

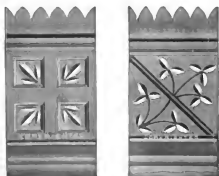
## What the Electrical World Says.

In its issue of Nov. 5, *The Electrical World*, referring to the fact that the demand had been so great for the "Scientific American Cyclopedia of Receipts" as to require the issue of a second edition containing thirty more pages than the original one, adds: "The material is arranged by subjects alphabetically, and in it will be found thousands of items giving information upon matters of every-day interest to the engineer, the metal worker, and the artisan. Among other subjects may be mentioned batteries, electro-metallurgy, alloys, rubber, tanning, varnishes, welding, etc., etc. A copy of this book should certainly be in the hands of every experimenter who is called upon to manipulate materials with which he is more or less unfamiliar. As a work of reference in the field it covers it is unequaled."

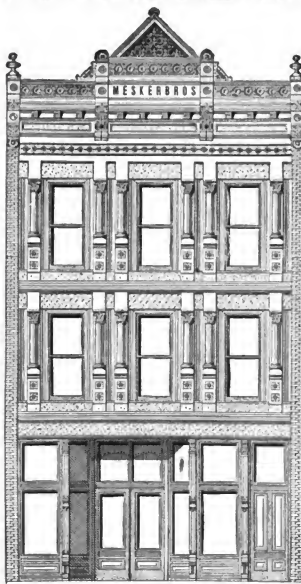
CROOKED WOOD has been found to have such excellent lasting qualities that its economical properties have suggested its use for permanent haulage roads, shaftways, etc., in collieries.

## FINELY CARVED WOODWORK.

The base, head, and corner blocks shown in the illustration afford but a slight idea of the extensive line of ornamental woodwork of this description which is made by Messrs. Liddell & Williams, at their factory, corner of Desplaines and Weyman Streets, Chicago. The firm have all the latest machine tools for carving, shaping, and finishing this class of work, all of which is made of selected kiln-dried lumber, and from original designs. Their catalogue presents hundreds of varieties and styles for the builder to select from to match almost any style of architecture and trim, while any new size or design required can be quickly turned out.



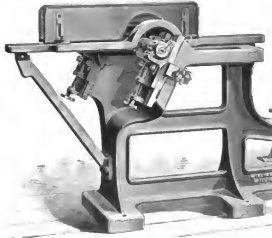
BASE, HEAD, AND CORNER BLOCKS.



A GALVANIZED SHEET STEEL HOUSE FRONT.

wide; three combination wood and steel columns; all the galvanized iron work for second and third stories, from bottom of lintel cornice to top of main cornice and pediment; all show windows, doors, transoms, store door posts, and transom bars. Also six window

frames, with sash, for upper stories; and all glass for first, second, and third stories to be of double strength. The net price of such a front free on board cars at St. Louis is \$300.



A NEW PANEL RAISER.

## STEAM AND HOT WATER RADIATORS.

The use of steam and hot water for general heating purposes in buildings has been proved superior to all other methods at present available, and their ability to meet the requirements of everyday use are universally recognized. In order to obtain the best results from these methods the radiators must be so constructed as to insure perfect circulation, and at the same time they should be artistic in design, graceful in outline and in perfect harmony with the necessities of modern architecture. Few people who have not given the subject special attention realize the importance of art, delicacy and compactness in a radiator. We would call the attention of such to the elaborate display made by the American Radiator Company, of Chicago, Ill., in whose show rooms at Nos. 111 and 113 Lake Street, shown in the illustration, can be seen over one hundred and fifty different sizes and styles of beautifully decorated steam and hot water radiators, made to suit the requirements of any desired space. This company is among the largest manufacturers of radiators in the world, having three extensive factories and employing hundreds of men. They have branch offices in New York, Boston, Minneapolis and St. Paul, Minn. In their Chicago building they have storage capacity for seventy-five cars of radiators.

## Plaster of Paris.

The Berlin *Technische Zeitschrift* gives some curious particulars in regard to the use of plaster of Paris. The employment of this material is much less general with us than it is abroad, but there are still many mechanics and artists here who would like to know enough of its properties to handle it to advantage. In the first place, a great deal of plaster of Paris is spoiled in the calcination by the notion that it is necessary to raise it, like quicklime, to a high temperature. The consequence is that the commercial plaster is burned very much at random in kilns, which deliver one portion overburned, and, therefore, inert, a second portion underburned, and also inert, and the rest calcined to the proper degree, but, if coal is used for burning, often contaminated with sulphide of calcium, and, therefore, unsuited for use. Before delivery, all these qualities are ground up together, the mixture thus depending for its setting quality entirely on the comparatively small percentage of properly burned and pure plaster which it contains. In consequence of this irregularity of the commercial material, sculptors abroad usually prefer to calcine their own plaster. They buy, when they can, powdered gypsum from a deposit known to be granular, rather than stratified, and heat it on a sheet iron plate over a gentle fire to

is observed, the powder should be stirred until the craters cease to form, and a cold piece of glass held over the heap of powder is not dimmed by the vapor. The operation is then complete, and the plaster should be removed from the fire and allowed to cool. No prepared plaster can be used over and over again. After it has been mixed with water, hardened and used for months, it is still plaster, with nothing added but water, which can be driven off by pulverizing and heating the powder exactly as before, when the plaster is recor-

in as alarming form in the upper quarters, as if the new sewers had conducted the contagion from the abodes of filthy misery to those of wealth and cleanliness. The same thing may be expected to happen with cholera germs, which, if once introduced into the sewers, would, if they will float in the air when dried, which seems to be the case, have plenty of opportunities to escape through street ventilators, dry traps, and leaky soil pipes, all over the city. The saturation of the sewers at short intervals with sulphur vapor would destroy the germs contained in them, and it would seem, do much to localize any sporadic case, or group of cases, while no harm could be done by the operation. Indeed, the principal homeopathic prophylactic against Asiatic cholera is sulphur; so that the inhalation of a few stray fumes, although, perhaps, unpleasant, ought to make the person into whose nose they accidentally penetrated feel himself doubly protected.—*American Architect.*

## A New Newspaper Building.

The New York *Herald* is planning up a new building at the junction of Thirty-fourth Street, Broadway, and Sixth Avenue, which is described as follows:

"The palace of Venice will be imitated and surpassed in beauty in the new home for the *Herald* in New York City. The building will be only three stories high, but it will cover a whole block, and have frontages of 41 feet, 119 feet, 194 feet, and 137 feet. On three sides there will be arcades behind columns of polished granite, and all the front will be ornamented like a dreamland castle with paeles, sculpture, and marble. The

front of the building, facing a square, will be surmounted by a clock, bell, and chimneys like those of the Piazza San Maria, in Venice, and two colossal typecasters will stand by the great bell to strike the hours with maces. Owls at the corner of the cornice will have eyes of wondrous power, being supplied with powerful electric lights. Behind arcade walls of clear plate glass the *Herald's* presses will red of 30,000 papers an hour in full view of the public. The building will be a brilliant spectacle at night, a beautiful sight by day, and at all times it will represent the best achievement up to date of gathering and presenting news."

## FINE STEEL CEILING IN AN ART GALLERY.

The accompanying illustration represents an interior view of an art gallery finished with a steel ceiling made by the Kinne & Tinger Co., of Columbus, O. Metal for interior work is becoming popular, and is being looked upon with favor by many prominent architects and engineers. The tongue and groove or end lock



SHOW ROOMS OF AMERICAN RADIATOR CO., CHICAGO.

tered in as good condition for use as ever.—*American Architect.*

## Disinfection by Means of Sulphur.

We do not think that sufficient publicity has ever been given to the remarkable experiment made at Detroit, during a severe epidemic of diphtheria and scarlet fever, in checking the spread of the disease by disinfecting the sewers with sulphur, tons of which were burned in them. The experiment seems to have been singularly successful. Of course, it would be rash to infer, from a single trial, the causal connection of things which may possibly have been simply coincident; but it is certain that as soon as the sewers had been saturated with the fumes of the burning sulphur, the epidemic declined rapidly, and both diphtheria and scarlet fever soon disappeared. The probability that cholera will make its appearance next summer is at least some of our large cities suggests the propriety of adopting this simple and inexpensive precaution, in case of the introduction of the epidemic into any



DECORATIVE STEEL CEILING OF AN ART GALLERY.

about the temperature of boiling water. If there is great access of air to the mass of gypsum, the heat may be somewhat less than that of boiling water, and it should never much exceed it, or the resulting plaster will be overburned and inert. As the heating of the gypsum powder proceeds, steam, or watery vapor, disengages itself from the mass, at first freely, and then locally, from little centers, which form themselves for a moment and then disappear. When this phenomenon

sewered town. Every one knows that the fumes of burning sulphur form the most potent of disinfectants, and cholera would in our cities probably spread more rapidly through the sewers than in any other way. It will be remembered that at Croydon, after the introduction of sewers, typhoid fever, which had previously been endemic in the lower parts of the town, but was almost unknown in the upper regions, inhabited by the rich and well cared for people, suddenly appeared

method is employed in this ceiling, and this end lock construction is being made of No. 27 soft steel. The fireproof qualities of ceilings of this character should receive due consideration. These ceilings are also recommended for use in many of our public institutions as a means of improving the sanitary conditions.

The most unalterable of water colors have been found to be yellow ochre, terra siena, sepia, and blues.

## VOLUME XIV.-JULY-DECEMBER. 1892

Articles Marked \* are Illustrated.

- I. Residence at Yonkers, N. Y. II. Residence at Marina Heights, Conn. July.
- III. A Cottage at Rutherford, N. J. IV. Residence in Brooklyn, N. Y. August.
- V. Residence at Plainfield, N. J. VI. Residence at Montclair, N. J. September.
- VII. A Colonial Residence. VIII. House at Montclair, N. J. October.
- IX. Residence at Cranford, N. J. X. City Residence, New York. November.
- XI. Dwelling at Warheth Park. XII. Residence at Suffield, Mass. December.

Figures preceded by star (\*) refer to illustrated articles.

Aluminum	3
Aluminum alloy	2
Aluminum frame	63
Architecture, Japanese, ruins of	47
Architect, Lewis	26
Architectural, Japanese	47
Asphalt paving in New York	32
<b>B</b>	
Bath heater	239
Baths, scarlet ruin of	112
Belting with cement joints	24
Bills, sliding, Waller	73
Bollies, frame	73
Bricks of glass	2
Bricks, red, New York	10
Brickwork, efflorescence	10
Bridge, Newark, High	80
Builders, a Help to	77
Building, a Jarry Story	22
Building, a New York	10
Buildings, base, Boston	86
Buildings, Additional, Erection	86
Bus home, Australia	10
<b>C</b>	
Carriage house	116
Car roofing	10
Ceiling, steel	70
Ceiling, Steel, Art Gallery	70
Ceiling, Water-gate	25
Chimney, roof	10
Chimney top, revolving	10
Church at Chester Hill, N. Y.	116
Church, Hering, N. Y.	10
Church of Morist	116
Church of Morist, N. Y.	116
Circulars, ventilation of	10
Cities of Nineteen	80
Closet door fastenings	84
Closet door, American	84
Closet house, Yacht	116
Cottage at Albany Park, N. J.	116
Cottage at Dulais, Pa.	116
Cottage at Fernwood, N. J.	116
Cottage, Mt. Vernon, N. Y.	116
Cottage at New York	116
Cottage at Orange	116
Cottage, California	116
Cottage of moderate cost	116
Cottage of moderate cost	116
Cottage of moderate cost	116
Cottage and separate kitchen	116
Cottages of Low Cost	116
Cottage, State Island	116
Cottage, St. Duval, Fla.	116
Cotton gin, electric	116
Cranes, safety	116
Crumbs, Education of	116
<b>D</b>	
Disinfection by Sulphur	116
Door, closet, fastenings	116
Door hanger, Harry	116
Door, safety, gate	116
Drains	116

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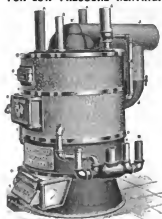
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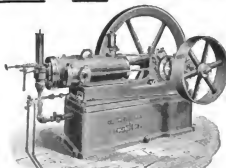
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### Notes and Queries.

(1) L. A. writes: A tank is full of water; the discharge pipe goes through the bottom of tank and up nearly to the top of the water, say 10 inches below the surface of the water in tank. Will the force of the discharge be increased by shortening the pipe? A. No.

(2) F. G. writes: I am a farmer. I want to build a pile of wood, because of its exposure. To get to lay up a solid wall of boards or planks 12 inches wide, and in dry or in wet. Then line the wall with three thicknesses of tarred paper, and dash with matched gun boards nailed on vertically. Now, the inside of these walls will rot, I fear, being so solid and air tight, and how can I prevent it? Shall I smear every board with gas tar and time before laying? Shall I hole holes from top to bottom of the wall, and wash the whole with crude petroleum or kerosene oil? What? Would any of these things favor the outside, and break the better? A. We do not approve of wooden walls for a pile. Anything like coal tar or petroleum will give the example a strong odor that is repulsive to cattle, and may favor the products of the dairy. We do not think the proposed wooden structure and its preserving material is as cheap as the one we will if it be as air tight as a concrete wall that can be made with hydraulic cement and gravel or small stones. A pile depends on the removal of carbonic acid gas generated by a slight fermentation for the perfect preservation of its contents from the destructive influence of the air. The gas, being less than air, settles to the bottom, filling the entire

pile to the bottom of air. Hence the necessity of making it gas tight. See Concrete Silo, in DECEMBER, No. 30.

(3) R. W. W. desires a receipt to make a good water stain to lacinate walnut, not to cost too much. A. Take of brown amber 2 parts, rose pink 1 part, glue 1 part, water sufficient; heat all together and dissolve completely. Apply to the work first with a sponge, then go over it with a brush, and wash over with water.

(4) J. J. W. asks: What height and width should a brick chimney be made, to give sufficient draught to burn gas both after being kindled and out draft? Length of boiler being 14 feet over all, tubes 15 feet long, 10 in diameter, 10 in boiler diameter, furnace being double, i. e., double the size of an ordinary one. Have you any idea as to what number of bricks it would require to build same? A. About 60 feet high, or perhaps more, according to location for draught, and about 3 feet square inside at bottom. Wet-burning requires large furnace or even capacity, and exceptionally good draught. Such chimney will probably take about 10,000 bricks.

(5) G. W. asks for recipe for staining new mahogany a deep red red without hiding the grain; also the best polishing material—and how to apply it—after the furniture is so stained. If a Silver should be used, please give recipe. A. The following is used when furniture is stained, and the old wood resists, be matched, so that the work presents a polished appearance. The pieces are washed with soap and water or kerosene.

(Continued on page vi.)

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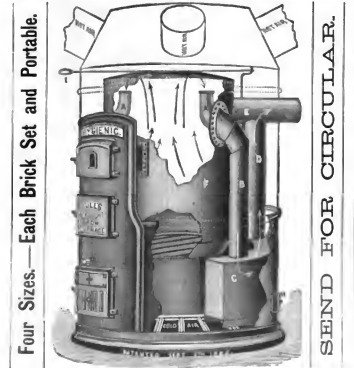
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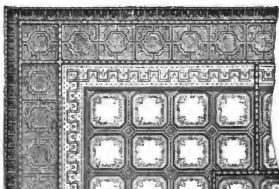


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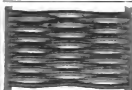
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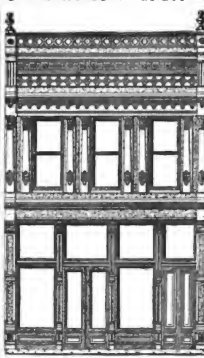


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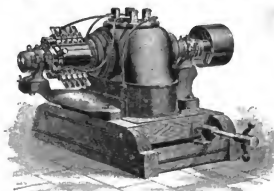




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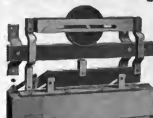
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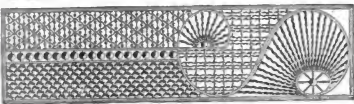
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2 1/2	14 1/2	1.10	1.20	1.10	1.20
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